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ABSTRACT

Southeast Alaska's birds and wetlands are the subject of this elementary school teacher's guide and student workbook. Included are classroom activities and field investigations which address: (1) bird identification, habitats, adaptation, and conservation; and (2) the inhabitants, ecology and value of estuaries. Workbook activities involve the development of vocabulary and reading skills using birds and wetlands as subject matter. A list of resource materials and a guide for organizing field trips are included. (WB)

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ALASKA SEA WEEK CURRICULUM SERIES FOURTH GRADE



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UNIVERSITY OF ALASKA

BIRDS

A Study Guide for the Fourth Grade

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ALASKA SEA WEEK CURRICULUM SERIES

ACKNOWLEDGEMENTS

Sea Week began in the early 1970's in Juneau, Alaska. Under the leadership of Mary Lou King, parents, teachers and agency personnel started taking elementary school students down to the sea every spring. Soon, Sea Week was an annual event with some of the junior high and high school students assisting the younger pupils on their field trips to beaches, wetlands, forests and glaciers. In 1978, a K-6 Sea Week curriculum was written with the assistance of Juneau teachers, scientists, fishermen, parents, and government employees - a true community effort. In 1979, the Southeast Regional Resource Center revised the material, adding worksheets and graphics and reworking certain activities. In 1980, endorsed as "The Year of the Coast" by President Carter, it seems very fitting that the Alaska Sea Grant Program is initiating a program to spread Sea Week statewide.

This first statewide edition is a product of Juneau - its people and environment. We would like to express our deep appreciation to the many foresighted people who contributed to Sea Week and especially to all the students who are the reason and impetus behind its success. Special thanks to Mary Lou King, Nancy Barr, Janie Cesar, Carol Koski, Dick and Betty Marriot, Virginia Eggert, Claudia Kelsey, Kathy Hanna, James G. King, Lynn Szepanski, Karen Gunstrom, Mary Beth Parsons, Dan Hopson, Kristi Kantola, Pat Thrasher, Tamara Smid, Judy Maier, Jerry Hard, Marty Early, Jan Conner, Mark Hansen, the Alaska Department of Fish and Game, the Alaska Coastal Management Program, the United States Forest Service, the Alaska Department of Environmental Conservation, the United States Fish and Wildlife Service, and the South East Regional Resource Center.

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PREFACE

The Alaska Sea Week Curriculum Series (K-6) emphasizes one or more aspects of the marine environment at each grade level. Kindergarten materials, for instance, are intended to introduce students to the exciting and curious world of the sea and shore. At the other end of the series, materials for sixth graders stress man's interactions with the marine environment. While the subject matter at each grade level is unique, as a whole the grade level guides will yield a broad understanding of the marine environment and its importance to Alaskans.

The purpose of this curriculum series is to help the teacher in interpreting the marine environment for elementary school students. However, what is included here is just a place to begin. As you read the following materials, you will find factual information about many aspects of the marine environment, and suggestions for presenting these concepts to students through multi-disciplinary activities both in the classroom and at field sites. Materials are organized into units, each covering a single idea or subject. From these you, the teacher, may select the units and activities which are best suited to your class, community and resources.

"Sea Week" originated in Juneau, and these curriculum materials are most applicable to southeast and southcentral Alaska. However, the Alaska Sea Grant Program has funded a three year pilot project to expand Juneau's successful program statewide. As Sea Week is piloted in 14 communities around the state, the Curriculum Series will be expanded to meet the needs of western, interior, and northern Alaska.

Send us your comments and suggestions. The strength of the final edition will depend not only on those of us staffing the project - but on you - your ideas and comments. After you've tried some of these activities - fill out and send in the evaluation sheet at the back of this book. Thanks so much!

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INTRODUCTION

Alaska has more than 33,000 miles of shoreline; the earth's circumference is only about 25,000 miles. Much of Alaska's complex and intricate shoreline is accounted for by the bays, inlets, headlands, islands of Southeast Alaska. Here, in Alaskan communities large and small we live in close contact with the marine world. Some of us make our livings by fishing or working for the Coast Guard, the State's marine transportation system, or marine shipping companies. Most of us spend at least some of our time sport fishing, digging clams, beachcombing, or just gazing out at the incredible scenery of snowcapped mountains and everchanging inland waters.

The dynamic marine environment of which we are a part is our heritage, our trust. It is only fitting that our children know that world intimately so that they can grow up in an understanding of its complexities, its subtleties, its importance. This is of particular urgency now that Alaska is facing increasing pressures to make decisions that will effect the use of her lands and seas for generations to come. We, and our children, must have a part in the decision making processes and the more knowledgeable we are, the more effective our participation will be.

Teaching children about the world in which they live is important and perhaps it has never been more important than it is in Alaska today. Teaching facts and concepts about the marine world is important but perhaps most important of all is the teaching of attitudes. It is hoped that through the study of marine life, students may gain the following:

1. An increased interest in their environment.
2. A greater awareness, appreciation, respect for the natural world that is so close about them here in Alaska.
3. The sheer delight, pleasure, happiness that can come from observing and understanding nature close up.
4. A sensitivity to the relationship between themselves and their environment.

If that can be accomplished, all our lives will be better because of it....

INTRODUCTION - FOURTH GRADE

The fourth grade materials in this series provides information for the study of birds and their environment. The student booklet Birds in Alaska's South Coastal Environment has activities covering:

- Kinds of birds
- makeup of a bird
- how birds live
- where birds live
- conservation
- birds in your area

The bird unit presents general information about birds and includes specifics to assist students in their identification of birds unknown to them.

A second unit: Estuaries, presents study materials on the plants and animals living in this environment. Included is the value of the wetlands as they relate to birds and to the sea. Estuary field trip activities and studies are outlined to round out this.

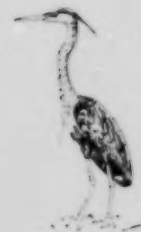
The hope is that students will gain an understanding of the estuary environment and an appreciation for the importance and beauty of birds. Including increased person pleasure and satisfaction from encounters with birds in every environment.



ALASKA'S BIRDS AND WETLANDS

Fourth Grade

- GOALS:
1. Learn about, identify and enjoy some of Southeast Alaska's birds.
 2. Acquire an appreciation for and knowledge of our wetland habitats.
 3. Learn about wetland conservation.



BIRDS IN THE SOUTH COASTAL ENVIRONMENT

It is recommended that each student:

1. Complete Birds In Alaska's South Coastal Environment, a student booklet for bird study, before going on the Sea Week Field trips. One copy is recommended for each fourth grade student.
2. Complete the Estuary Worksheets--or at least participate in a class discussion on estuaries.

FOURTH GRADE FIELD TRIP TO THE BEACH DURING A MINUS TIDE

The On-Site Organization in the field trip section of this folder is recommended for beach activities.

1. Divide the class in groups of 5 or 6 students with a parent or older student with each group. Explore the lowest part of the beach when the tide is out.
2. In addition, before going to the beach go over again the section in Birds In Alaska's South Coastal Environment on Habitat Page 17. Make a list of bird habitat things to look for while at the beach:



FOOD
COVER
SAFE NEST SITES

At the mid-point of your beach trip sit down and discuss:

- a. What did you see that birds could eat?
- b. Did you see a bird eating? What?
- c. Is there any cover for birds here? Where?
- d. Where could birds nest? What birds?
- e. What else did you see?

3. For the remainder of the time you might:

- a. Take a serious bird walk in small groups. Record all birds seen: (describe if they cannot be identified) in the water, on the beach and in the bushes or trees. The students could then check these birds on their own lists in the back of the bird booklet when they get back to the classroom.
- b. Place some food (bread, herring) at widely separated spots on the beach, then sit quietly in small groups by the food and watch to see what comes -- listen to sounds and watch what goes on during the quiet time.



The best beaches for birds are those at the mouth of a river or creek, however, some birds can be seen at all the beaches.

FIELD TRIP TO AN ESTUARY

In an estuary the fresh water from the river carries nutrients from the land that mix with the nutrients in the sea water making a very rich place for plants to grow. Some plants grow in the water, some grow in the mud flats and some grow on the uplands where they are only rarely covered with tidal water. The abundant plant life provides food for all sorts of animals from microscopic to large birds, fish, etc. The variety of plant life also provides shelter or cover as well as many nest sites. For these reasons there are more birds on the estuaries than on any other type of habitat near the sea.

Materials Needed:

1. Binoculars and hand lens (if available)
2. One plastic sandwich bag for each student and one large bag for the group leader.
3. Pencil and clip board (plastic bag to cover) for each group of students (four groups)
4. Large piece of cardboard, felt market and small roll of scotch tape for each group.

Preparation for Estuary Field Trip:

1. The student booklet Birds In The South Coastal Environment has illustrations of the most common estuary plants along with the list of the most common birds in the coastal area. If the students have studies both of these they will have some idea of what to look for on the field trip.

2. Students should know what an estuary is and how it is made or develops. Check in the library for more information if you or students are interested in more than has been presented in the Estuary Unit.
3. Follow the appropriate suggestions for getting ready for the Field Trip on Page 3. Warm clothes and rubber boots are important.
4. Students could talk to old timers, hunters, bird-watchers and parents about the estuary. Compare what they hear with what they see.
5. Divide the class into four groups before leaving for the Field Trip. One parent or adult for each group is recommended. Make the student bird book available to the parents well in advance of the Field Trip.

ESTUARY TRIP

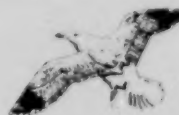
1. Organize the groups with Biology training students, knowledgeable parents, biologists or other volunteers, at the beginning of the field trip.
2. Plan the order to be followed for use of the "experts" (plant, bird, ecology) with each group.
3. Explain the rules
 - a. Stay with your assigned group
4. Distribute the plastic sandwich bags (one for each student) and the worksheets on Page 24 (one for each group) and explain the activities.
 - a. Observe and record birds on the worksheet. These birds can then be checked in the students's bird booklets when they get back to school. Record what man has done to the estuary.
 - b. Collect the items that are listed after these instructions. This could be used as a scavenger hunt with some recognition for the most complete collection and/or the nicest display, or just as a learning experience.
 1. Group leaders work closely with your group so that only what will be used is collected. Stress Conservation.
 2. Collect nothing larger than will go in a sandwich bag and only one sample of each thing in each group.



The plants on the list are those illustrated in Birds In The South Coastal Environment student booklet, therefore, if individual students would like to keep very small samples of these plants to take back to their classroom and tape in their books by each illustration, they may do so.

3. Do not collect live animals.
4. Spend the last 15 minutes of the trip having each group prepare a display of the things collected by taping and labeling the collected items on a large piece of cardboard. These displays can then be taken back to the classroom for judging and follow-up learning activities. Students could check the accuracy of the plant labeling from the illustrations in their bird books.

LIST OF THINGS TO COLLECT



Five things from the tidal area to include:

Seaweeds (Fucus and Ulva)
 Goose Tongue
 Sedge
 Beach Rye Grass

Five different Fungi, Lichens, Moss to include:

Bird's Nest Fungus
 Lichen
 Mosses

One Fiddle Neck Fern

One Fruiting Body of Horse Tail

Five of the following:

Lupin	Dandelion
Marsh marigold	Fireweed
Yarrow	Dock
Black Lily	

One of each of the following:

Spruce Tree Needle and Cone	Cottonwood Bud
Alder "cone"	Male and Female Willow
	(Male "pussy", Female seed)

Five animal evidences such as: Feather, Shell, Bone.

c. Follow-Up Activities:

1. Write stories or reports that might be given orally to their own class or some other fourth grade as a method of sharing Sea Week knowledge.



- a. What is an estuary?
- b. The bird I like best on my field trip.
- c. Why I would like to be a bird.
- d. I like the Estuary because.....
- f. I did not like the Estuary because.....



2. Write a thank-you note to someone who helped the student learn something new and to enjoy seaweek.

ESTUARIES AND THEIR INHABITANTS

INTRODUCTION

An estuary is a very special kind of place, it is that area where rivers or streams meet the sea. Unique conditions exist in this environment where land is continually being exposed to the air and light then covered by various mixtures of fresh and salt water.

As students begin to study and think about estuaries and to explore them, they will find that many of the ideas they have learned about the sea and its inhabitants can easily be seen. They will need to think about how the estuary is different than the sea because of the presence of freshwater.

Estuaries have a special importance to man and to the cleanliness and quality of both the land and the marine environment. By the end of the study of estuaries, students should have an understanding of the importance of estuaries and should have a knowledge of many of the plants and animals there.

UNIT 1. WHAT IS AN ESTUARY?



Objectives

- To learn that an estuary is a place where fresh water and saltwater meet, where rivers or streams enter the sea.
- To understand that the mixture of fresh and salt water constantly rising and falling make the estuary a special, unique place.

Teacher Background

The forces at work in an estuary are ever changing and they define what an estuary is.

If we think first of the fresh water that enters the estuary, we realize that the water as it enters the sea is as variable as the weather over the adjoining land. When rains have been heavy, great quantities of water may enter the estuary, but when the air is dry, the water flowing into the estuary is far less - or even none! Melting snows of winter bring one kind of water to the estuary, "gully-washing" torrential downpours another. Sometimes the flow is gentle, sometimes powerful; sometimes the stream or river flow is clear, sometimes it is laden with silt or other debris from the land. If man lives near the estuary, it may carry with it industrial chemicals or other bi-products of man's civilization and these too enter the estuary.

Where the river confronts the sea, the forces of the ocean cycle without cease. Tides rise and bring more salt water into the estuarine environment; tides ebb and carry with them fresh water from the estuary. Winds mix the masses of fresh and salt water, creating an environment too salty for many freshwater plants and animals, and too fresh for most sea-living life forms.

The tidelands are "sea floor" part of the time and exposed to air, sunlight, wind and atmospheric temperatures at other times. Every day and every part of every day is different.

Materials:

- slide-tape presentation; The Heritage of our Environment: Estuaries Part I and II in Southeastern Alaska: and Ecological overview (available from SERRC)
- student gathered pictures of estuaries
- student worksheet

Procedure.

10

The slide-tape presentation listed above is intended

for older students, but it does define an estuary and might be a good starting place for a class discussion. You might want to preview it and decide whether to use part or all of it, and whether it would fit best at the beginning of your study or at the end as a summary activity.

Present students with the definition of an estuary. Perhaps simply:

Estuary (es-tu-er-ee): a place where freshwater from rivers and streams meets and mingles with saltwater from the sea

Encourage students to think about the area in which they live. Are there any estuaries?

While even a small stream has its own estuary, estuaries that are larger or more extensive may involve large inlets, lagoons, or extensive shallow flats or grassy areas. If there are places in your local area that are called "tidelands" or "saltflats", these are probably estuaries. They may be the deltas of rivers where sediment is deposited at the edge of the sea. Step rock shores may also be part of an estuary. In the most expansive terms, all the inside waters of Southeast Alaska are an estuary.

As you start the study of estuaries, you might encourage students to look through natural history or geographic magazines to find pictures of a variety of estuaries. These could be used for bulletin boards or for covers of student booklets.

As a gauge to students of what they will learn, ask them to list on paper or name some of the following:



- fishes
- sea animals that are not fishes (invertebrates or mammals)
- birds
- plants

List as many as you can that you think might live in an estuary. Keep this list and when the unit is completed, make a second similar list and compare the two.

The first of the series of worksheets on estuaries might also be completed by each student at this point.

UNIT 2. PRIMARY PRODUCTIVITY IN AN ESTUARY

Objectives

- To understand what primary productivity means.

- To measure some primary productivity in an estuary.
- To learn to identify one of the important plants in the estuary.

Teacher Background

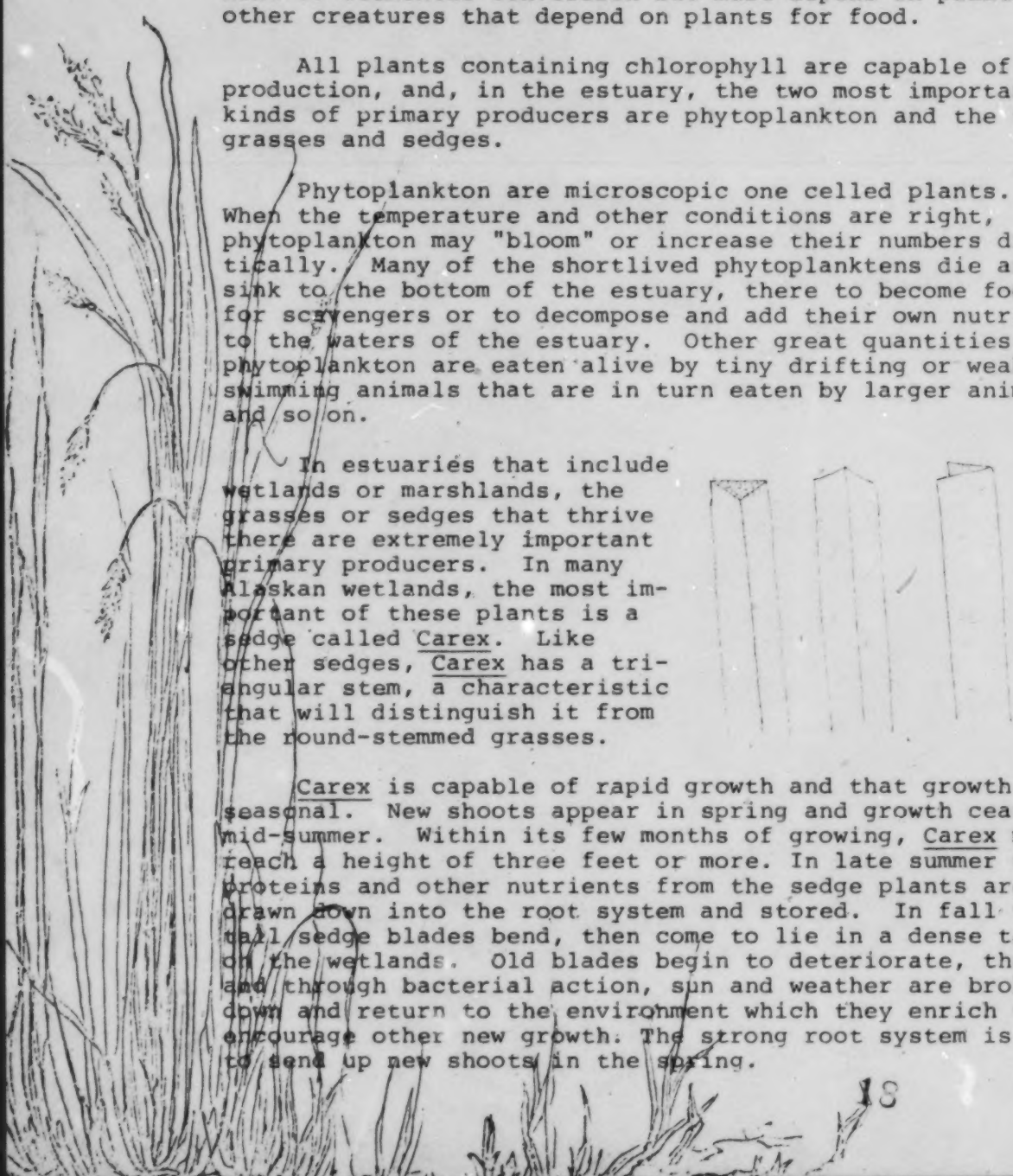
Primary productivity is a term that refers to the production of food material by plants. It is called "primary" because it is the most fundamental kind of food production, one that involves gathering energy from the sun, nutrients from the environment, and, in the presence of chlorophyll, converting these into organic material. Animals cannot make this kind of elemental conversion but must depend on plants or other creatures that depend on plants for food.

All plants containing chlorophyll are capable of primary production, and, in the estuary, the two most important kinds of primary producers are phytoplankton and the tall grasses and sedges.

Phytoplankton are microscopic one celled plants. When the temperature and other conditions are right, phytoplankton may "bloom" or increase their numbers dramatically. Many of the shortlived phytoplanktons die and sink to the bottom of the estuary, there to become food for scavengers or to decompose and add their own nutrients to the waters of the estuary. Other great quantities of phytoplankton are eaten alive by tiny drifting or weakly swimming animals that are in turn eaten by larger animals, and so on.

In estuaries that include wetlands or marshlands, the grasses or sedges that thrive there are extremely important primary producers. In many Alaskan wetlands, the most important of these plants is a sedge called Carex. Like other sedges, Carex has a triangular stem, a characteristic that will distinguish it from the round-stemmed grasses.

Carex is capable of rapid growth and that growth is seasonal. New shoots appear in spring and growth ceases by mid-summer. Within its few months of growing, Carex may reach a height of three feet or more. In late summer the proteins and other nutrients from the sedge plants are drawn down into the root system and stored. In fall the tall sedge blades bend, then come to lie in a dense tangle on the wetlands. Old blades begin to deteriorate, then rot and through bacterial action, sun and weather are broken down and return to the environment which they enrich to encourage other new growth. The strong root system is ready to send up new shoots in the spring.



Carex is important because it introduces nutrient material to the estuary through the process of decomposition. But in addition it serves as shelter and food for many small organisms and much of the year but particularly in winter and spring is an important food for Canada geese, and perhaps for other geese as well. Geese feed on the massive root system of the Carex as well as on the stalks just above the roots. If you live in an area where Carex can be found, you may see groups of geese gathered in spring to feed on this plant.

Where estuarial waters are more saline than fresh, algae such as Fucus may be found growing luxuriantly in rocky areas.

ACTIVITY 1: PRIMARY PRODUCTIVITY AND THE ESTUARY

Objectives



- To understand that plants produce "food" from the raw materials of their environment.
- To learn two kinds of plants that are important in producing food in the estuary.

Materials:

- chart or diagram showing cycle of a green plant, including food production
- worksheets on phytoplankton and Carex

Procedure.

If students have not already learned about how plants produce food or if they need a review, use a diagram like the one below to discuss with them the importance of plants to all life.

Stress with students the idea that only plants can produce food; animals get all their food from plants or from other animals that eat plants - they cannot manufacture it themselves. So if it were not for plants, there could be no life as we know it on this earth.

When students understand the importance of plants as primary food producers, tell them that there are two very important kinds of food producing plants in an estuary - one is phytoplankton and the other is the grasses or sedges. By using any available, relevant science texts, the teacher background notes, and the student worksheets, teach students about phytoplankton and the sedge Carex.



CYCLE of a GREEN PLANT



Green Plants use water, sun, nutrients from soil to make new leaves and stems - that is to grow!

Green Plants produce seeds or in other ways insure that there will be new plants like themselves.

The plant dies, decays, and returns as nutrients to the soil.

Before they die, many plants may be eaten by animals, large or small.

ACTIVITY 2: LOOKING CLOSELY AT CAREX LYNGBUAEI



Objectives

- To identify Carex as it grows in an estuary.
- To begin to understand its importance in the wetlands.

Materials:

- a small wire frame, about 1/4 meter or foot square -
'can be made from bent coat hangers
- a long stake or other kind of marker with a red handkerchief attached - or some other means of marking a location in a marshy area
- magnifying glasses , notebook and pencils

Procedure.

Prepare the class for a field trip and outline with them carefully what you plan to do and what you will be studying. The activity could be carried out with the whole class or could be assigned to several students working with an older student or adult advisor.

Discuss with the students involved the fact that there are any number of plants growing on the wetlands but that you are interested, on this study trip, in finding and identifying just one of them - Carex. Discuss the idea that you are interested in learning something about its importance on the wetlands. You may want to have students suggest approaches they think they might want to try.

When you arrive at the study site, have the students find Carex as soon as they can. If your field trip is made in early spring, the new Carex growth will be visible as stiff, strait, pointed shoots perhaps no more than 3 - 4 inches tall. Each shoot may include about 4 blades surrounding the central, triangular stem. It will probably be pink to purple, but green will be showing at the base of the new growth. By the first of May, Carex may be 6 - 8 inches high and growing more green than pink or purple.

After students have located Carex and everyone recognizes it, select an area for your study plot. You will want to select an area where Carex grows thickly and where (if you are working in the spring) the fallen growth from the previous year is still evident and thick. To find such an area, you may need to look higher rather than lower in the intertidal zone.

When you have found a good spot to sample, bring your wire frame and other equipment to the spot. Place the wire frame on the ground. Some students may want to measure

the height of the previous year's growth of Carex in the plot, others may want to examine that growth, particularly at ground level in search of insects or other animals that might be living on it. Some students may want to try counting the number of Carex stems growing within the plot frame. All of these activities combined will start to give an idea of the massive growth and the importance of this plant.

ACTIVITY 3: MEASURING THE BIOMASS OF A CAREX SAMPLE

Objectives



- To determine how much mass of Carex is produced in a small plot including the roots underground.
- To determine how much mass is added during a month of the growing season of Carex. (Optional)
- To compare the biomass of a Carex plot with the biomass of another kind of area. (optional)

Teacher Background

Determining how much food material a plant produces is not hard to do. The one important notion that must be taken into account is that water does not count. Every plant stores a greater or lesser amount of water in its tissues, but because the amount of water varies from one kind of plant to another, we must remove that water if we want to be able to make a comparison between two different kinds of plants - or even between the same kinds of plants at different times or under differing conditions.

Materials:

- wire frame as mentioned in Activity 2
- a means of marking the location of a plot on the wetlands
- scissors or knives
- shovel
- an oven (optional)
- a balance (scales)
- a large plastic bag or gunny sack

Procedure.

While at the field site with students, conduct any or all of the suggestions outlined in Activity 2. With Carex identified and recognized by all the students, and with a plot selected and marked, you are then ready to harvest the plot. If you are sampling in early spring, you may want to cut off only the old growth, and measure the height of the

new shoots. Alternatively, you may cut off all growth at a measured distance above ground level - perhaps three inches.

Carefully gather up the Carex that has been cut and place it in a bag. Check to be sure that you have carefully cut everything growing within the plot boundaries but have not harvested outside it. Now, with the plot carefully marked - if you want to return to it - you may move to another location where Carex roots are exposed along the stream banks to check roots and determine the probable root mass in your plot.

Find a cut-bank and separate a Carex plant, which is growing there, from its root. Count the number of Carex plants in your plot. Later students can multiply the number of plants times the weight of one to determine the probable total root mass for the plot.

When you return to the school with your bag of Carex, you are ready to dry then weigh it. To do the former, place the cut Carex in a low oven until it feels light in weight, or tie it in small bundles and hang it up to dry. Either way when it is dry, weigh what remains. To do this you may have to tie it in bundles, break it up, or devise some method to compact it.

The answer you get when the dried Carex is weighed is a measure of how much food Carex growing in an area the size of your plot can produce.

SUPPLEMENTARY ACTIVITIES.

1. Students may wish to harvest plants growing in another kind of environment - perhaps the school yard, the forest edge, a lawn - then follow the same drying and weighing procedure and compare the productivity of the two areas.
2. If you have harvested your Carex plot in early spring, you may want to return to it a month later, use a ruler or meter stick to measure how much taller the stems have grown, and then cut off the new growth, dry it, weigh it and determine what percentage of the annual growth appears to have taken place in the month's interval.
3. Review or use the activities concerning Fucus. (Included in the third grade guide in this series)

UNIT 3. INVERTEBRATES IN THE ESTUARY

Objectives

- To understand that a estuary is home for a wide variety of invertebrates.
- To recognize some of the invertebrates living in an estuary and to discover where each lives.

Teacher Background

Invertebrates are animals without backbones - insects, spiders, crabs, snails, sea stars, and many, many more. Because an estuary is a complex environment with freshwater, brackish water and salt water, it is home to a wide variety of invertebrates that live on or near some kind of water.

Every species of organism has its own unique set of requirements, a set of qualities that must be present in the environment in order for that plant or animal to be able to survive and reproduce. If students have used this curriculum series in third grade, for instance, they have learned where each species of intertidal animal is found depends on such factors as:

the kind and amount of food available 
 the intensity of light
 the plant's or animal's resistance to drying
 the plant's or animal's tolerance to fresh water
 the plant's or animal's adaptability to surf conditions
 the plant's or animal's success in competing with
 other organisms for the same space.

In an estuary the same kinds of factors are important in determining where any species of invertebrate will be found. The most obvious of factors is the degree of saltiness or freshness of the water. Some species, for example, may be found in the estuary only where the water is quite salty, while others survive only in the fresh stream or river water or may be able to tolerate certain degrees of salt or freshness between the two extremes.

While the factors that limit animal distributions are so complex that biologists do not fully understand them, elementary students should be able to grasp the idea that each animal species has its own built-in set of environmental requirements. By exploring an estuary and recording where several kinds of animals are found, students can begin to associate each kind of animal with a particular kind of place.

ACTIVITY 1: THE ESTUARY, HOME FOR INVERTEBRATES

Objectives

- To recognize kinds of invertebrates that inhabit estuaries.
- To record where each kind of invertebrate is found in the estuary.

Materials:

- worksheet on invertebrates in the estuary
- checklist or notebook and pencil

Procedure.

In class discuss the idea that each living species of plant or animal needs particular qualities from its environment in order for it to live and reproduce. If students studied intertidal ecology in third grade, review with them what they learned about why different intertidal species live where they do. Discuss familiar land plants and animals (what lives in forests, gardens, lawns, deserts, etc.) and then marine or freshwater plants and animals.

Encourage students to think about the differences in environmental conditions that might be found WITHIN an estuary (water saltier or fresher, grass and sedges present or absent and thick or sparse, presence of fine silt, rocky areas, sand, amount of surf or wind, amount of exposure to sun, etc.).

Allow class time for students to complete the worksheet on invertebrates in the estuary.

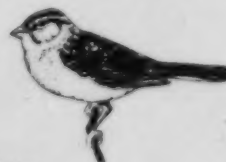
By using the checklist of invertebrates in the estuary, introduce or review the kinds of invertebrates often found abundantly in estuaries. Prepare students for field activities by being sure they can recognize these and identify them.

IN THE FIELD

When the class is visiting an estuary on a low tide, assign several students or the whole class to spend a portion of their time "surveying" the estuary for the animals on the checklist. Students should think about the area where they are and decide how best to look at a cross section of it. It may prove best to draw a visual line from a creek mouth or riverbank, through grass and sedges to more open salt water. Begin at one end of the imaginary line, examine each differing kind of habitat and list for it the kinds of animals that are found there. FOR SAFETY'S SAKE, THIS ACTIVITY MAY NEED TO BE DONE AS GROUP WORK WITH ADULT SUPERVISION.

In the field at the end of the above, outlined survey or later the same day (or the next) in the classroom, tabulate and analyze what students observed. Decide on key words to describe each kind of habitat you observed. For instance:

tidal edge
steep creek bank
stream
bare mud flat
at base of thick sedges
large shallow tide pool, etc.
grass - spruce - alder line at top of tidal
influence



For each kind of habitat, list the animals that were found there. Then encourage the class to decide which animals could be found in freshest water, which in saltiest, which seemed to have the greatest tolerance for a wide range of salt concentrations, which were on or in silt, which in rocks, in tide pools, etc.

ADDITIONAL ACTIVITIES

1. Art, science. As a class or individual project make a map of the estuarine area that was visited. Mark or represent on it the animals found and their locations.

UNIT 4. FISH AND THE ESTUARY



Objectives

- To understand the importance of an estuary in the lives of many fishes.

Teacher Background

Because of the deposition of land derived soils in wetland or estuarine areas, these places are extremely rich in nutrients which foster plant growth and create a rich environment for many animals. The estuarine web of life is extremely complex. Plants grow, decay, are fed upon by animals large and small. These animals in their turn become food for other animals or else die, decay and return thus to again enrich the natural system.

If this complex system could be reduced (which it cannot) to a linear chain of who-eats-who-and-is-eaten-by-whom, fish would have a place near the top of the list. Feeding as they do primarily on smaller fish and on invertebrates, fish are carnivores whose very survival depends on the healthy continuance of a complex system that produces in ample supply the kinds of food they need.

Some fishes are year round or life long residents of the estuaries, while others, including salmon, may pass through the estuaries or spend part of their early lives there. In either case, the estuary is essential to their survival - and they, in many cases, continue to be an important human food source. Thus although seeing all the links, causes and effects is often difficult, estuaries and their well-being are important to us because they supply us with food.

ACTIVITY 1: THE IMPORTANCE OF THE ESTUARY TO FISH

Objective

- To gather a background understanding of how fish fit into the life scheme of an estuary.

Materials:

- films, texts, visual material as available
- worksheet

Procedure.

Discuss with students the idea of fish as part of the complex life in an estuary. Encourage them to think and talk about such ideas as:

What kinds of fish do you think might live in an estuary? Why?

What might fish in a estuary eat?

Why would an estuary be a good place for them to live?

If fish live in an estuary, how does this make an estuary important to us?

After developing a class discussion and supplementing it with whatever material is available, allow students time to complete the worksheet on fish in the estuary. You may want to continue the discussion to include ideas found on the worksheet.

ACTIVITY 2: SALMON IN THE ESTUARY

Objective

- To realize by first hand experience that estuaries may have an abundance of salmon fry during the spring months.

Teacher Background

Salmon are anadromous fish, that is they spend part of their lives in fresh water and part in salt water. Every late summer or fall, millions of salmon in Alaska return from a period of living in salt water, enter the streams where they themselves once hatched from eggs, spawn and die. The eggs that they deposited remain in the gravel of the

streams over winter. The following spring, young salmon move out of the streams to salt water beginning again the cycle of life of their parents.

As young fry emerge into the waters of the estuary they begin to feed in earnest. Their lives are tenuous and the survival of each individual as well as each species depends in large part upon the abundance of food that the estuary has to offer.

Understanding this cycle and seeing part of it as young salmon move from fresh to salt water help students appreciate one more part of their environment.

Materials:

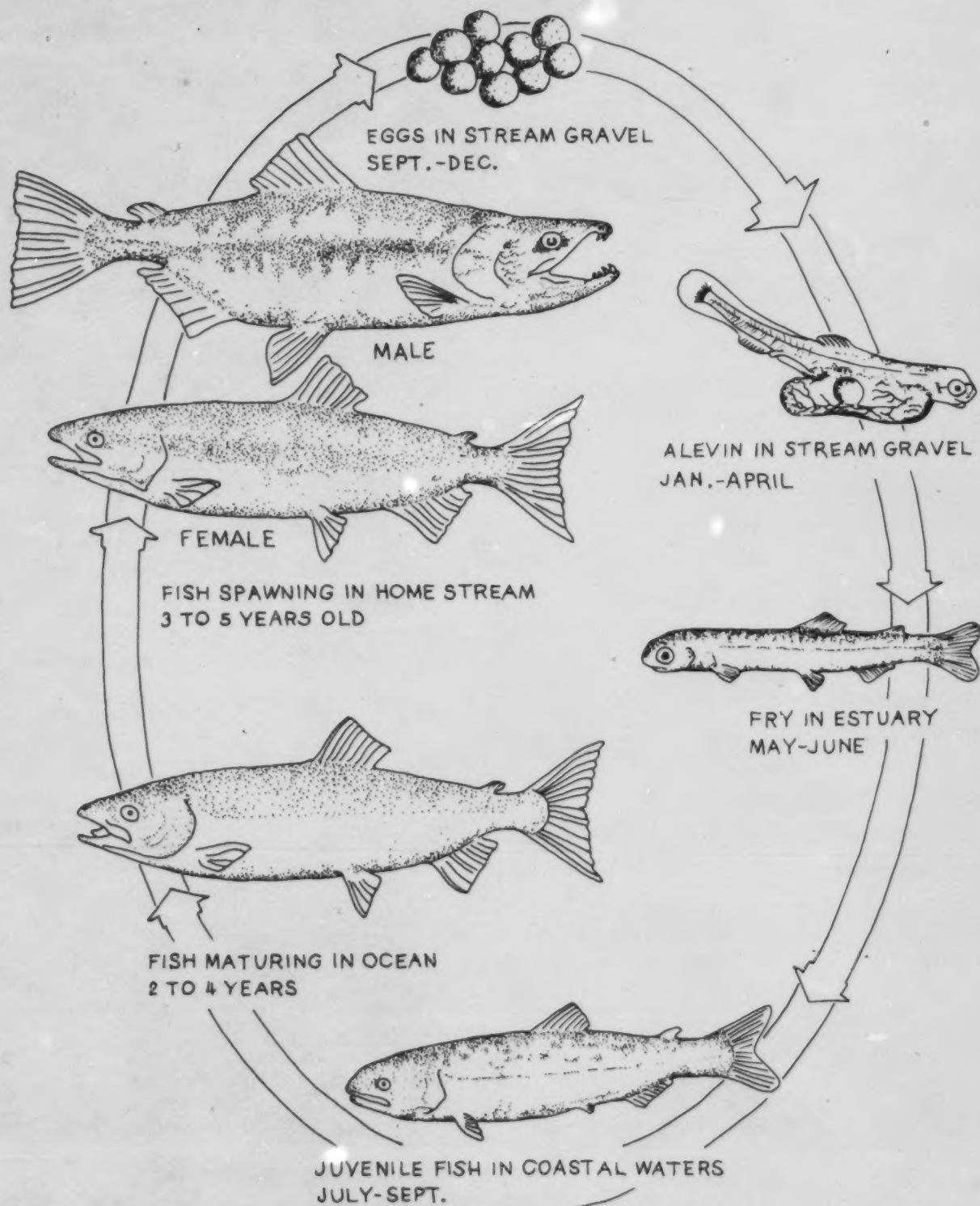
- simplified diagram of life cycle of salmon
- movies or filmstrips as available
- beach seine or minnow trap - purchased or borrowed

Procedure

In class discuss with students the general life cycle of a salmon.

Assuming that you are teaching this unit in spring, stress the fact that it is at this time that salmon are emerging from the streams and beginning their salt water existence. (Many students may already have detailed familiarity with the salmon cycles. If they do urge them or their parents to share this knowledge with the class.)

Life cycle of Chum Salmon



AT THE FIELD SITE. CAPTURING SALMON FRY.

Using either a beach seine or a minnow trap (enlist help if these are unfamiliar to you!), involve the class in attempting to capture some of the outmigrating salmon fry. Minnow traps should be baited and left in the stream overnight.

After students have seen the salmon fry, understood their significance and their place in the web of estuarine life, release them, stressing to students the importance of giving the fish a chance to grow and mature. Don't touch the fish or keep them long, as even mild stress can be fatal.

OTHER ACTIVITIES.

1. Science. Arrange to have someone from Alaska Department of Fish and Game talk to your class about salmon and their life cycle.
2. Creative Writing. Ask each student to make up a story about a salmon's life in the estuary, including the dangers and pleasures the fish encounters.

UNIT 5. MAN AND THE ESTUARY



Objectives

- To understand that wetlands have great, direct and indirect, importance to our lives.
- To understand that the care we take of them and our attitude toward them effect the quality of all our lives.

Teacher Background

The following excerpt from a publication of the National Wildlife Federation sums up many of the environmental values of wetlands occurring in river flood plains or estuaries.

"Wetlands play a vital role in pollution control. They trap, retard, or transform materials such as silt, pesticides, toxic metals, and organic matter. Microorganisms found in wetlands break down air pollutants such as sulfate, and water pollutants such as nitrates. Wetlands serve as living filters, removing phosphates and nitrates and storing them as nutrients for vegetation growing in the bottom mud. At the same time, wetlands generate significant amounts of oxygen by way of their abundant plant-life and their nitrogen-fixing and sulfate-reducing bacteria.

"Wetlands hold silt and sediment carried by flood waters which might otherwise end up in navigation

channels (necessitating expensive maintenance dredging) and in shellfish beds. These silt particles frequently carry pesticides and other toxic substances. By holding the silt, wetlands help these hazardous substances out of our water supplies. Keeping even silt out of the water is important because suspended silt blocks out sunlight, which reduces photosynthetic action, which in turn reduces the growth of bottom plants and phytoplankton. Increased turbidity also hinders the feeding and breathing of many fish and may even impair migratory and reproductive behavior. A thin layer of silt, for example, can suffocate fish eggs after spawning.

"There are limits, however, to the pollution-absorbing capacities of a wetland. Excessive pollution can totally disrupt a wetland's ecological balance and transform it from a healthy, valuable resource into a putrid, polluted, mosquito-ridden liability.

"When allowed to do their job, wetlands are quite remarkable. Recent studies have demonstrated that wetlands can reduce levels of biochemical oxygen demand (BOD), phosphates and coliform (bacterial) counts, while producing significant amounts of oxygen."



Sullivan, Peter. Versatile
Wetlands - An Endangered Resource.
Conservation News. October 15, 1976.

In terms of dollars and cents, environmental economists estimate that it would cost at least \$50,000 per acre to replace all the functions that a wetlands performs. The importance of wetlands is hard to underestimate, and it is important that the students who will grow up to make decisions about them understand their value.

Materials:

- film or filmstrip on tidelands (as available)
- worksheet

Procedure.

Review with students what they have learned about tidelands. If a film is available, use it as a summary activity. Discuss with the class the ideas developed in the quotation included in Teacher Background. Allow time - and help - for students to complete the final worksheet on estuaries.

ADDITIONAL ACTIVITIES.

1. Encourage students to select a particular aspect of tidelands and prepare a report for the class.
2. Prepare a wall-size representation of the tidelands and their importance to man, wildlife - include plants and animals, marine and freshwater species.

TEACHER SUGGESTIONS FOR THE USE OF THE STUDENT BIRD BOOK

If possible each student should be given a copy of this booklet (pgs. 1-49 plus the eagle front piece). If you COPY this student booklet, it is designed to be duplicated back-to-back.

The ten activities outlined could be used independently, for instance: "Habitats", which includes plants, could be used either very early in the fall or in late spring when plants are present for study.

The checklist on pages 40-49, while compiled for spring, has many illustrated birds that could be seen and identified in the fall and winter. A copy of these pages could be taped together and displayed making it possible for the students to see all the material more easily.

One objective in preparing this book was to have students discover that they each already know something about birds. Students can learn from each other, and from this book. If they still have questions, other bird books and field guides and/or community experts can be consulted.

Possible Schedule

- 1st Session - Cover pertinent student materials (pgs. 1-4). Additional bird books and pictures may be displayed. Students should understand they are to fill in just the first three columns of their bird list (columns 4-7 will be filled in as they go through the booklet.)
- 2nd Session - What is a Bird? (pgs. 4-8) Try to obtain several feathers for students to handle for this section.
- 3rd Session - Making a Living (pgs. 9-11)
- 4th Session - Nests (pgs. 12-13). Discuss the importance of not disturbing nesting birds.
- 5th Session - Migration (pgs. 14-16) A large map of North and South America might be helpful when locating birds' winter homes.
- 6th Session - Habitat (pgs. 17-31) Observing and identifying some of the plants near the school might be helpful. Plant samples from students' homes may be displayed.
- 7th Session - Conservation (pgs. 32-33)
- 8th Session - Bird Watching (pgs. 34-35; 40-49) Students should already be observing and identifying birds after school and on weekends. Field observations with the group both within walking distance of the school and in an estuary or other good birding area might be planned.
- 9th Session - Additional Activity (pg. 36)
- 10th Session - Bird Word Search, etc. (pgs. 37-39)

Additional worksheets are included in the back of the 4th Grade Book.

BIRDS IN ALASKA'S SOUTH COASTAL ENVIRONMENT



I AM AN ADULT BALD EAGLE - COLOR ME
MY HEAD AND TAIL ARE WHITE
MY FEET AND BILL AND EYE ARE YELLOW
MY BODY IS DARK BROWN

I AM AMERICA'S NATIONAL BIRD

NOTE TO TEACHERS

This is a bird study program for Fourth Graders who attend school in the forested parts of coastal Alaska, particularly Southeast. They could work on it alone or in small groups. It will be more effective if the teacher leads discussion of the question sections. It should not require additional materials; however, use could well be made of bird books, bird pictures, the Audubon Alaskan Bird Chart, or other materials.

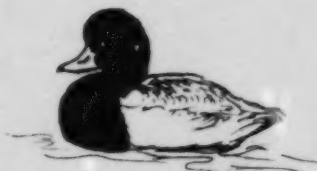
The best field guides showing pictures of all coastal area birds (plus many more) are:

Birds of North America, by Robbins, Bruun and Zim.

A Field Guide to Western Birds, by Roger Tory Peterson.

The program has been divided into ten activities, each of which could be used for one class period. Teachers with additional materials or with time for group discussion may wish to use several more periods.

At the back starting on Page 40 is a check list of the 62 most common birds that you may see in the spring. The information on this list will be helpful while doing some of the activities. Have students begin immediately to check the boxes to the left of each bird they see and can identify. Recognition might be given to the students with the longest lists by the end of the school year.



NOTE TO STUDENTS

Identify these birds. If you do not already know their name look them up in the list at the back of the book. Write their name under the picture. Do this for all bird pictures as you read this book.



BIRDS IN THE ALASKA COASTAL ENVIRONMENT

I. Introduction

There are more birds in the world than there are people. Birds live everywhere that people do and almost everywhere that people go - from the center of cities to the wilderness, high in the mountains and far out to sea. There are always birds around where most of us go or live. That is why everyone knows quite a lot about birds. You will be surprised to find how much you know about birds as you go through this book. You will also be surprised at what each of your classmates knows. You will find that as you all share your knowledge about birds you will all learn something new.

Some of the things you will discuss are:

	<u>Page</u>
II. Different kinds of birds.....	3
III. Why you can't be a bird if you don't have feathers.....	5
IV. How birds use their feet and mouths in different ways to make their living.....	9
V. Where birds build their nests.....	12
VI. How birds avoid harsh weather and shortages of food by migration.....	14
VII. You will have a chance to look at birds in their habitats (where they live).....	17
VIII. Discuss ways in which people can do the things they need to do without ruining the places birds need (Conservation).....	32
IX. Birds you can see in your area.....	34
X. Additional activities.....	36
Checklist of Southeast Alaska's most common birds.	40

ACKNOWLEDGEMENTS

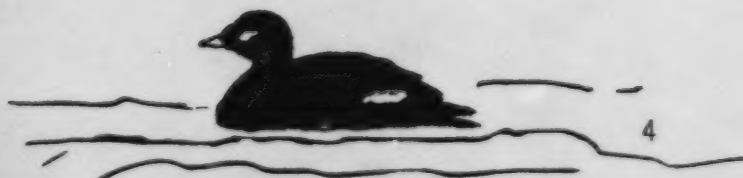
Many Juneau people have helped prepare this workbook including Janie Ceaser, Frank Glass, Claudia Kelsey, Jim King, Mary Lou King, Sara King, Jamie King, Virginia Eggert, Ann Schneider and Cindy Roper. Many of the bird illustrations were done by Laurie Wojeck, Alaska Department of Fish & Game. Support was provided by the U.S. Fish and Wildlife Service.

This is the second edition - revised 1979.

Perhaps your teacher would wish to ask each student in turn to name one of the birds from his list and write it on the blackboard. Then ask the class members who also have this bird on their list to raise their hand and write the number after the bird. In this way you can learn how many birds are on the class list and which birds are on most of them. Then you can fill in the three questions below.

1. How many birds on your own list? _____
2. How many birds on the class list? _____
3. Which birds were on the most lists?

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____



III. ACTIVITY: WHAT IS A BIRD?

You probably know that birds are one of the main groups of animals, but how are they different from other groups?

Is it because they can fly? yes _____ no _____

Can anything else fly? yes _____ no _____ What? _____

Is it because they can build nests? yes _____ no _____

Can anything else build a nest? yes _____ no _____ What? _____

Is it because birds lay eggs? yes _____ no _____

Can anything else lay eggs? yes _____ no _____ What? _____

Is it because birds have feathers? yes _____ no _____

Do other things have feathers? yes _____ no _____ What? _____

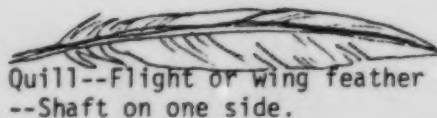
BIRDS ARE THE ONLY CREATURES IN THE WORLD THAT HAVE FEATHERS.

Look at the ones shown below, then answer the questions.

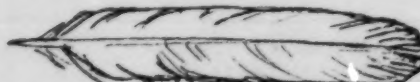


Body feather

Down feathers



Quill--Flight or wing feather
--Shaft on one side.



Tail feather

How many kinds of feathers are there? _____

Write their names:

1. _____
(underwear)

3. _____
(top coat)

2. _____
(flying)

4. _____
(steering)

Which of these feathers would you put in a sleeping bag?

Which feather would make a pen? _____

How can you tell a wing feather? _____

How can you tell a tail feather? _____

Flight feathers and tail feathers have a shaft and a web. The web is held together by tiny barbs. You can pull the web apart, then by running it through your fingers hook it back together sort of like opening and closing a zipper. Try this if you have a feather in the classroom or if you find a feather on the beach. Look at the barbs through a magnifying glass. Birds keep their feathers in good order (zipped up) by preening with their bill. Most birds have an oil gland. By oiling their bill and then preening they keep their feathers waterproof. When you are out, look for a bird preening.

Have you ever wondered how many feathers a bird has?

Guess how many feathers a chicken would have. _____

How many feathers do you think a swan would have? _____

A tiny hummingbird has about 1,000 feathers. A chicken has about eight times that many. Can you figure out about how many feathers a chicken really has? Put your answer on the line beside your guess.

A swan has about 25 times as many feathers as a hummingbird. Can you figure out about how many feathers a swan has. Put your answer on the line beside your guess.

Do they have more or less feathers than you guessed? _____

How Birds Fly

Birds like airplanes are streamlined and are built of light materials so they have less weight to lift. Feathers point backward. Bills are lighter and more streamlined than the heavy jaws of mammals and reptiles. Most bird bones are hollow and filled with air from their lungs. Even the wish bone is hollow. Next time you eat chicken or turkey look at the hollow bones.

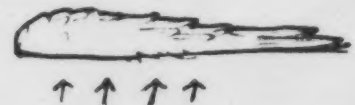


Bird wings move too fast for us to really see what they are doing. Slow motion movies show that they are actually pulling themselves forward like a man rowing a boat. They push air down and back with the broad side of the wing, then slightly turn and fold the wing to move it forward. Birds wings have an air foil like airplane wings that provide lift. Some birds with great broad wings can soar and glide for long periods without flapping.

An Air Foil

Airplane Wing

Bird Wing



Hold a piece of paper like this and blow under it. The force of the wind will push it up.



Now blow across the top of the paper and watch it lift.

Fast moving air has less density than slow moving air and the more dense air will push toward the less dense place. In an air foil, air going over the wing has to go farther than if it goes under, therefore, it has to go a little faster reducing density and causing lift.

Name a bird with large wings that soars _____.

Name a bird with little short wings that has to keep flapping hard most of the time _____.

Before a bird lands it sets its tail and wings against the wind like brakes to slow itself down. Water birds often use their feet like skis to slide along the water as they land. Watch a duck land in the water and see if you can see it apply "brakes" and slide on its "landing gear."

Draw a bird in the space below with each part near the label.

Crown of Head

Eye

Bill

Back

Throat

Breast

Wing

Tail
Feathers

Feet

IV. ACTIVITY: Making A Living

People use their lower limbs (legs and feet) to travel (walk).

People use their upper limbs (arms and hands) to gather food and build shelter.

Birds use their upper limbs (wings) to travel (flying or sometimes swimming as a penguin).

Birds must gather food and build shelters (nests) too and wings are not much use except to travel. But birds do use their feet and mouth in lots of ways.

Birds do not have teeth. Birds have a bill or beak.

Different birds have different bills to help them get their food.



SHORT STRONG BILL for eating and cracking seeds (sparrows, grosbeaks, waxwings, etc.)



LONG SPEAR-LIKE BILL for catching fish (herons, kingfishers, etc.)



SHARP HOOKED BILL for tearing animal food (eagles, hawks, owls, etc.)



SLENDER BILLS and wide mouths for catching insects (swallows, warblers, etc.)



LONG POINTED BILL for digging little animals out of the mud (sandpipers, snipe)



STRONG SLENDER BILL for probing for worms or picking up seeds (robin, blackbird, etc.)



WIDE FLAT BILL for eating pond weeds and sifting mud (ducks, swans, etc.)



CHUNKY FLAT BILL for eating grass and roots (geese, etc.)



STOUT HOOKED BILL to catch and tear fish and scavenged food (gulls, etc.)

All birds can walk even though they use their wings as their primary means of getting around. They also use their feet for:



SWIMMING (webbed), ducks, geese



WADING in water and soft mud (long straight toes and usually long legs), heron, sandpiper



GRASPING prey (long talons and curved feet), eagles



PERCHING or grasping on branches (long curved toes), robins, sparrows



SCRATCHING for food (three strong toes in front and a spur-like toe behind), chicken

Some birds have additionally specialized feet such as woodpeckers for holding onto tree bark. The dipper has long, thin feet that clutch rocks and the ptarmigan has feathers on its feet that hold it up in the snow.



Woodpecker: 2 toes go forward and 2 back for gripping tree bark



Ptarmigan: toes covered with feathers for snow shoes



Dipper: has long toes to clutch rocks while it is walking under water

Fill in columns 4 and 5 on page 3 with feet and bill types for the birds on your list. The checklist beginning on page 40 may help you determine the type of feet and bills if you have listed wild birds from your area.

When everyone is finished, exchange lists. See if you agree with the type of feet and bills entered on this list. If you see an entry you do not agree with raise your hand and see what the rest of the class thinks. Everyone can correct their list when they get them back.

If no one in the class knows about the feet or bill of some bird perhaps you can find out in the library or call an expert with a Government Agency.



V. ACTIVITY: NESTS.

Where a bird builds its nest depends on how large it is, whether it can use its feet or bill to make holes or carry sticks and grass and so forth. What sort of nest is needed also depends on what condition the young are when they hatch. Some young birds are helpless when they hatch and must have a place where they will not fall out and where their parents can feed them for several weeks until they can fly out. These are called ALTRICIAL birds. Most perching birds and tree nesters (humming birds, robins, eagles) have altricial young. Other baby birds can walk and pick up food soon after hatching. These are called PRECOCIAL young. Chickens, ducks, and shore birds have precocial young. Precocial chicks usually must be kept warm (brooded) by their parent at night or when it rains. The parent, usually the mother, broods the young by covering them with wings and body.

Precocial Birds



Altricial Birds



The next page is a drawing of some habitat. There are a number of places where a bird could build a nest. Put a number at each place you think a bird might nest, then write the bird's name by the same number below.

- | | |
|----------|----------|
| 1. _____ | 5. _____ |
| 2. _____ | 6. _____ |
| 3. _____ | 7. _____ |
| 4. _____ | 8. _____ |

If you have a question about some nesting places or what would use them, ask someone or look in a bird book.

Perhaps the teacher will have time to ask how many people placed five nests, six nests and so on.

How many nests did you locate? _____

What was the highest number in class? _____





VI. ACTIVITY: MIGRATION.

Some reasons birds migrate (move from one part of the country to another) are:

- To find food
- To find places to nest
- To avoid cold weather
- To find open water (not frozen or dried up)

In Alaska there is lots of food for birds in summer. In winter there is less food for birds.

List some kinds of food birds can find in Alaska in the summer but that are not available in winter when the lakes are frozen and snow covers the ground.

1. _____
2. _____
3. _____
4. _____

Where do birds go in winter? The following map shows half the world. The lines on the map show where two birds we see in the summer go for the winter. The line marked (1) is for a robin that goes to California and the line marked (2) is for a barn swallow that goes to South America.

Look in a bird book or at the bird list at the back of this book and see if you can find where some of the birds you know go for the winter. Write the bird's name and where it goes on the chart. Then draw a line from where it spends the summer to where it spends the winter. Put the number you have given the bird on the chart on the line showing its migration.

Name of Bird	Where Bird Goes in Winter
1. Robin	California
2. Barn Swallow	South America
3. _____	_____
4. _____	_____
5. _____	_____
6. _____	_____
7. _____	_____
8. _____	_____



List some birds that stay in your area all winter. What do they eat?

Name of Bird	What Does it Eat in Winter?

Find a picture in an old magazine of a bird or birds that stay in your area all winter. Paste or tape the picture here.

Look at the last column of the bird list in the back of this book.

How many birds stay all winter in coastal AK? _____

How many do not go south of Cal.? _____

How many go to Mex. and Central America? _____

How many go to South America? _____

VII. ACTIVITY: HABITAT.

The habitat of any animal or plant is the place where it lives.
A bird's habitat must have:

Food - Seeds, plant leaves, buds, insects, mice, fish, other birds, etc.

Cover - This might be bushes and trees for protection from the weather or from natural enemies. Cover is sometimes required for safe nesting. Cover could be a place to roost (rest or sleep).

Safe Nest Sites - Some birds spend most of their time in the air. Some birds roost on the water and spend most of their life out of sight of land at sea. But all birds must put their eggs on land.

In general the habitat with the most variety has the most different kinds of birds. The tide flats and nearby upland has the most variety of any habitat in our area. A place where a river meets the tide is called an ESTUARY. An estuary may have islands, marsh, trees, bushes and other features at its edge.

Following are some pictures of important plants you will see on a trip to the tide flats area. These are part of the habitat of the estuary.

Collect a piece of each of these plants and tape it next to the picture.

Color the plants as near their natural color as possible. Look at the plant or in books for colors you do not know.

Draw your own picture of a plant or plants, in the empty spaces in this section of your book, from the habitat of the estuary and tape a sample of that plant next to it.

SEAWEEDS

On the lower parts of the wetlands, the only plants that grow are ones that don't mind being covered by salt water at high tide.

Some seaweeds are washed up on the wetlands. One is our common Fucus with little "bulbs" which are fun to pop when we walk on them.

Another you often see left by the tides, in thin green sheets, is "sea lettuce" or Ulva. When it is growing in water, it is quite pretty and does look something like a lettuce leaf. It is good to eat but DON'T eat the old dry pieces left by the tides.

Some are "seashore plants" that like some salt water: "goose tongue" (picture on page 23) is one of these. Its real name is Plantago maritima. Maritima tells you it lives by the ocean. Goose tongue is good to eat if it is growing in a clean, unpolluted place.



"Sea Lettuce" Ulva
"Daaw"



"Né" Fucus

FUNGI, LICHENS, MOSSES

In the parts of the wetlands that are above the tides, you will find larger (and older) plants, trees and shrubs, and many flowering plants as well as grasses.

You may see some early mushrooms (you would see more in the fall), and dry bracket fungi and "bird nest" fungus.



There are many interesting lichens. (Some kinds of Algae and some fungi grow together to make lichens.)

You will see some on the ground, in the moss or sand, and some growing on the trees or fallen branches or stumps, or on rocks.



You will want to look at the fruiting bodies with a hand lens. Some look like little pumpkin pies.

Up among the trees mosses will be everywhere - on the ground - on stumps. There are many kinds.

Look at the little "elf caps" on the spore capsules (like seed pods). Use a hand lens. Some look like bird heads.



FERNS

There will be ferns up by the trees. When you go in spring, the ferns will have died down over winter - you will see the dead brown fronds on the large ones - but maybe some "fiddle heads" or "fiddle necks" starting up. Do you see why they call them "fiddle necks?" "Fiddle" is a name for a violin.



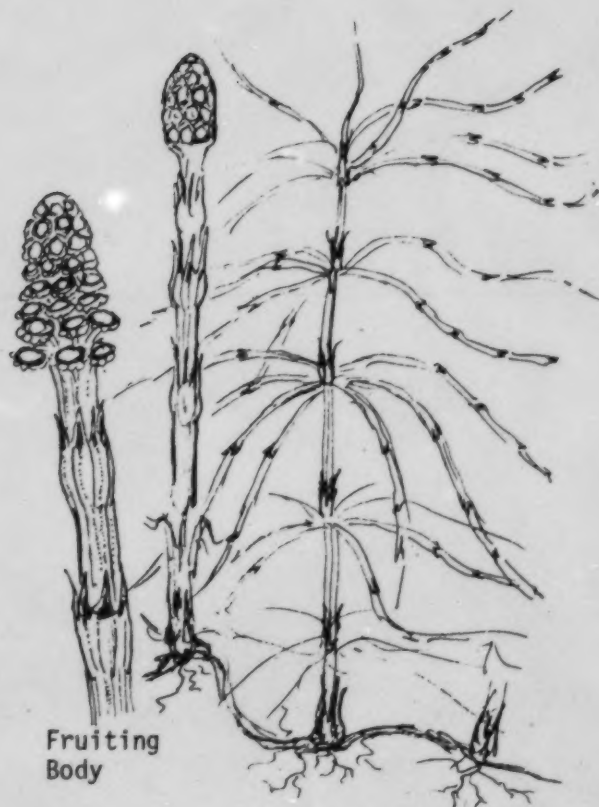
You may see liverworts.



HORSETAIL Equisetum

Instead of regular seed, horsetails have "spores in a fruiting body" that looks like a little cone.

Tap the top of a dry, almost open "fruiting body." The spores will come out like a soft green powder on your hand.



SEDGES AND RUSHES

If you cut the stems you will see that most sedges have triangular stems. You will see many kinds of sedges. They are very important as food for geese and other waterfowl. That is one of the reasons we have so many Canada geese on our wetlands, some of which spend both winter and summer here.

In the wetmeadows on higher ground you may flush a Wilson's snipe.



GRASSES

The large rye grass grown on the beach and sometimes up higher. Rye grass is used to make baskets (Aleut).

There are many kinds of grasses on the wetlands. Usually grass has a round stem.



FLOWERS

If you go to the higher wetlands above salt water where the trees grow, there are many flowering plants. In the early spring, you will only see the old dry stalks or leaves of most of them.

It is interesting to see how many of the wild flowers, (which you know very well when they are in bloom), you can tell when they first come up or from the old seed pods. Can you tell all of the flowers on the next page?

Some plants have many "common names" or "nicknames." The lily Fritillaria is called "rice root", "Indian rice", "chocolate lily" and "black lily." The Tlingit name is "kóox." And sometimes not such nice names, because the flowers do have a rather unpleasant smell.

Goose tongue grows where it gets some salt water from the tides. Its Tlingit name is "táa wák lútée."

If you would like to color or paint the flowers on the next page, use colors as near to the right color as possible.

Find a picture of a local flower to tape here.



Lupine



Fritillaria
"rice root"



Dandelion



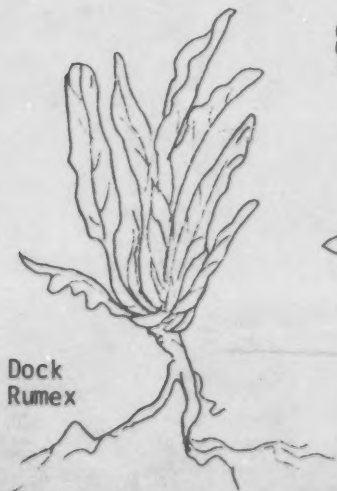
Goose Tongue



Yarrow



Fireweed
Lóol



Dock
Rumex

Marsh Marigold

UMBELLIFERAE

Another plant that has many names is the "Indian rhubarb" or "cow parship." It is also called "wild celery." The Tlingit name is "yana eit."

You probably know this plant. It is large and has rough, hairy stems and leaves that make blisters on some people. It has white flowers in a large umbel. There are other flowers on the wetlands that belong to the same family, but they are not so big as the cow parsnip.

Angelica looks much like cow parsnip but has different leaves - smooth and shiny - and not so BIG. The flowers are often a little pinkish or lavender, not so white as cow parsnip.

This family is often called Umbelliferae because of the umbels, the flower heads like umbrellas! It is also known as the "carrot family" or "parsley family" or "celery family" because all these good FOOD plants belong to this family.

But don't let that fool you! Some of the most POISONOUS plants also belong to this family. One grows in our wetlands. It is "water hemlock" or *Cicuta*.

Several of our wild Umbelliferae are EDIBLE (good to eat) but NEVER eat any of them unless with someone who REALLY KNOWS the plants.



UMBELLIFERAE



Indian Rhubarb
or Cow Parsnip
or Yana eit
(Do not collect)



Angelica



WATCH
OUT!!

P
O
I
S
O
N



Water Hemlock



If the root is
cut open there are
"shelves" on the inside.
(Do not collect)

TREES

You will only see a few kinds of trees on the wetlands, and only on the shore, or where there are islands of land above the high tide.

The largest tree is the SITKA SPRUCE (the only native spruce in Southeast Alaska). One way you can tell it is a SITKA SPRUCE is to feel the ends of the needles; they are very prickly sharp!

Because they are narrow and often pointed, the leaves of conifers are called needles, and the leaves of Sitka spruce really feel like needles! In the spring you will see little paper-like brown "caps" covering the ends of the fresh new growth. When the covering caps first come off, the new leaves are a bright, light green and soft (if they are ready you may pull the caps off gently) but very soon they become stiff and sharp and feel like "grown up" sitka spruce leaves.



Sitka Spruce
"Yan"
Picea sitchensis

The spruce seeds are in cones. Trees with cones of this type are called CONIFERS. Each SCALE on the cone holds two little seeds; each seed has its own wing, so then the ripe cone opens, the wind will carry the seeds to new places to grow.

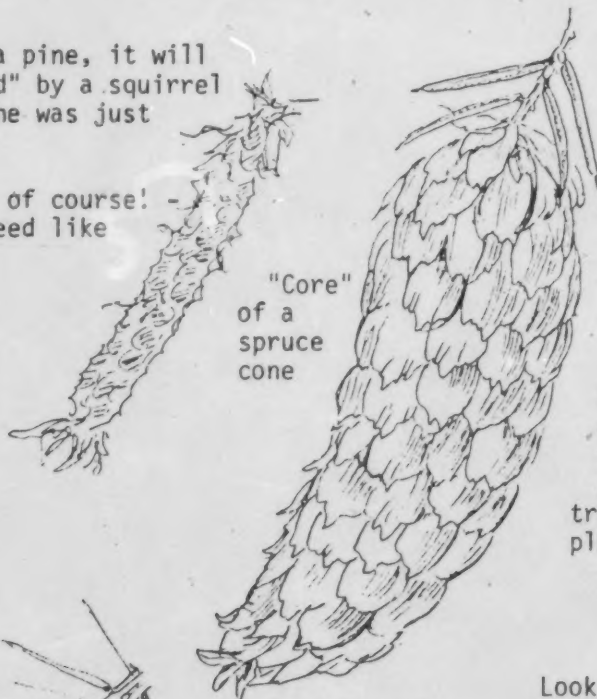
There would not be room for all the seeds in the cones to become trees, but the nut-like seeds are good food for birds and small animals like squirrels. You may find a place under a big spruce where squirrels have left the center (core) of the spruce cones - just the way you might leave the core of an apple.

Our other conifers are NOT common on the wetlands, but if you look very hard, you may find a western hemlock or even a pine. The hemlock is easy to tell from the spruce; its needles are flat and soft and rounded at the ends. They have very small cones which also have seeds with wings.

There is only one kind of native or wild PINE tree in Alaska, but they may look very different, depending where they grow. Some get to be very tall, large trees and some are a dwarf size, even when they are very old trees.

Perhaps if you do find a pine, it will be one that was "planted" by a squirrel or a bird, who thought he was just hiding a good pine nut!

Pines have PINE CONES - of course! - which have scales and seed like other conifers.



"Core"
of a
spruce
cone

On Sitka spruce the needle-like leaves are sharp as a needle.

Seed, with its own wings, ready to fly away to grow a spruce tree in a new place.

Bud with "cap"



The scales on the spruce cone look something like shingles on a roof.

Look at the scales of a spruce cone. Even if the seeds have "flown" you can see where they have been.



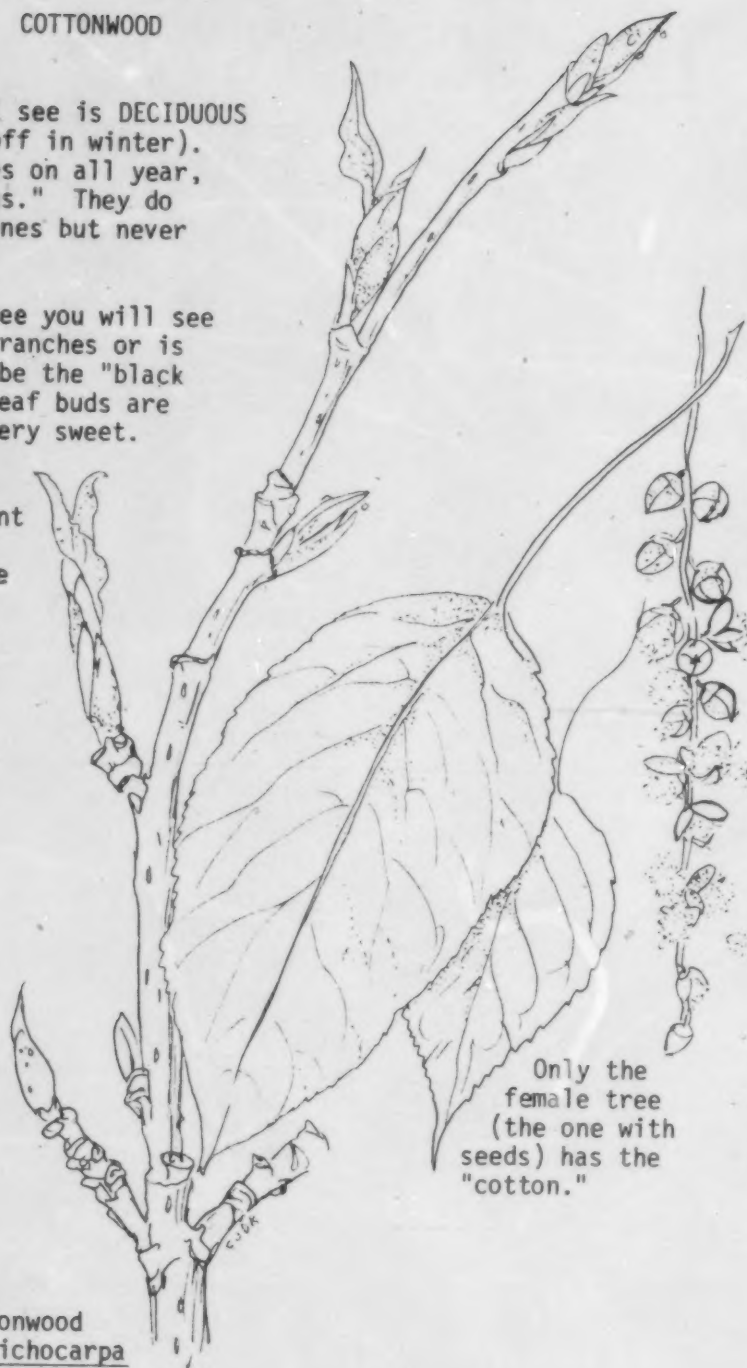
Find a spruce cone and count the scales. There should have been two seeds in each scale. How many seeds should there have been in the cone? _____

COTTONWOOD

The other large tree you will see is DECIDUOUS (that means its leaves come off in winter). The conifers keep their leaves on all year, so they are called "evergreens." They do get new leaves and drop old ones but never all at once!

So, probably, the only big tree you will see in the spring that has bare branches or is just getting new leaves will be the "black cottonwood." In spring the leaf buds are sticky with resin and smell very sweet.

You may see the flowers or "catkins." The male and female flowers are on different trees. Only the female tree has the "cotton" that the name "cottonwood" comes from. The "fluffy-cottony" hairs on the little seeds help them travel with the wind.



Only the female tree (the one with seeds) has the "cotton."

Black Cottonwood
Populus trichocarpa

WILLOWS are shrubs or small trees. The male and female flowers, like the cottonwoods, are on different trees. The male tree has the "pussy" that we like to pick in the spring.

ALDER

Alder male flowers or "catkins"

Male flowers have little gray "pussys" that turn into yellow "catkins."

"Pussywillow"

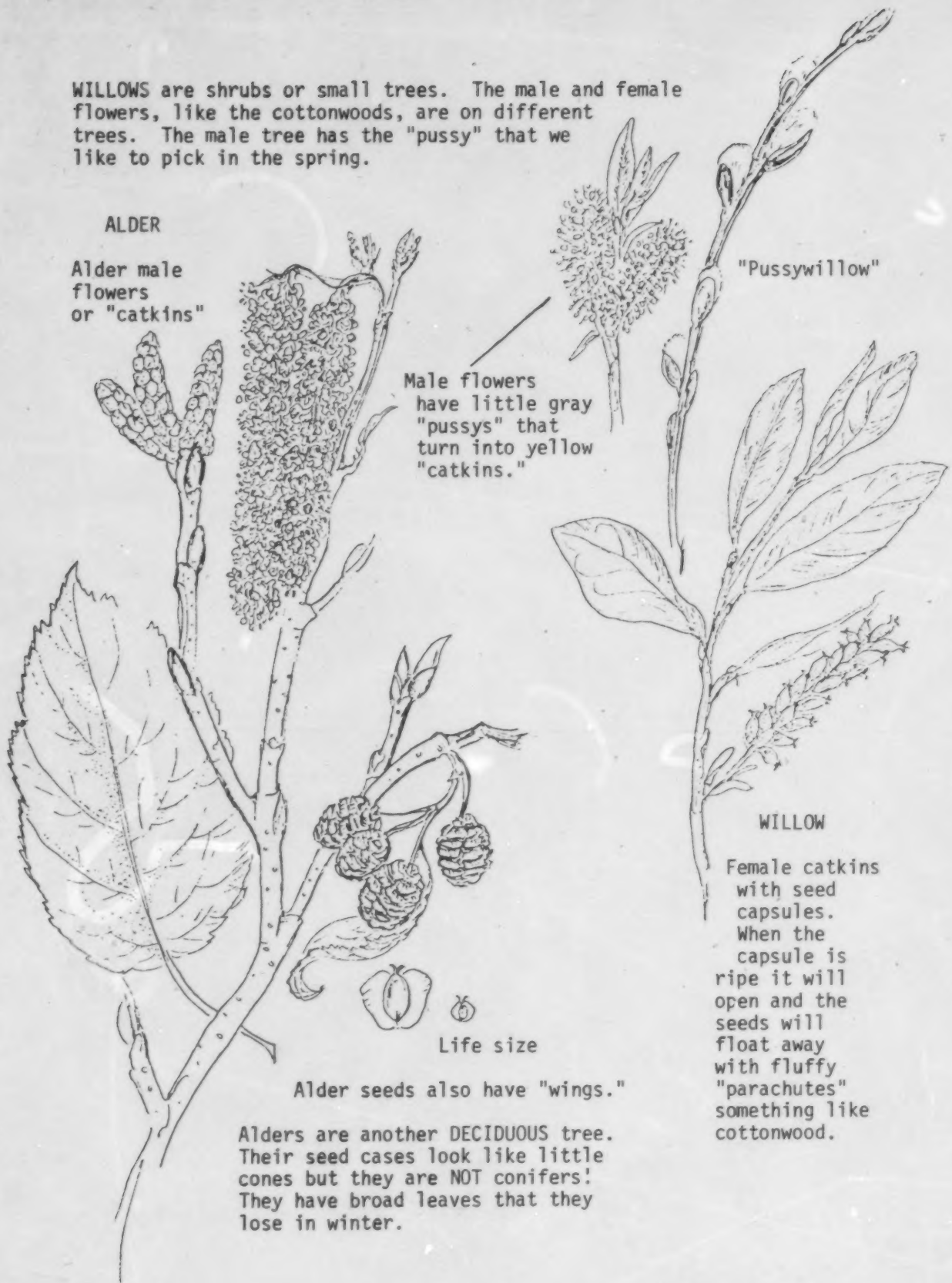
WILLOW

Female catkins with seed capsules. When the capsule is ripe it will open and the seeds will float away with fluffy "parachutes" something like cottonwood.

Life size

Alder seeds also have "wings."

Alders are another DECIDUOUS tree. Their seed cases look like little cones but they are NOT conifers! They have broad leaves that they lose in winter.





List some of the things that might attract birds that provide variety in the following types of habitat:

Forest

Estuary

- | | |
|---------|----------|
| 1 _____ | 1 _____ |
| 2 _____ | 2 _____ |
| 3 _____ | 3 _____ |
| 4 _____ | 4 _____ |
| 5 _____ | 5 _____ |
| 6 _____ | 6 _____ |
| 7 _____ | 7 _____ |
| | 8 _____ |
| | 9 _____ |
| | 10 _____ |
| | 11 _____ |



Wild habitats also produce food for people.

List some food that people get in these habitats.



Forest

Estuary

1 _____	1 _____
2 _____	2 _____
3 _____	3 _____
4 _____	4 _____
5 _____	5 _____
6 _____	6 _____
7 _____	7 _____
	8 _____
	9 _____
	10 _____
	11 _____



Estuaries are valuable for people as well as birds.

In Column 6 on your bird list on page 3, name the habitat where you would expect to see each bird. Some of these habitats could be forest, fresh water lake or marsh, estuary or wetlands, in your yard, in a city, in a zoo, on a farm, or perhaps, for some of your birds, in a book or movie.

If you do not know where you would see a wild bird from this area, look in bird books or the bird checklist starting on page 40.





VIII. ACTIVITY: CONSERVATION.

In an estuary like our tidelands there are a lot of things people can do. Some things destroy habitat, some do not.

List things that people do on our flats that do not destroy the habitat.

- | | |
|---------|---------|
| 1 _____ | 5 _____ |
| 2 _____ | 6 _____ |
| 3 _____ | 7 _____ |
| 4 _____ | 8 _____ |

List some things that people have done on our tide flats that do destroy habitat for birds or other creatures.

- | | |
|---------|---------|
| 1 _____ | 5 _____ |
| 2 _____ | 6 _____ |
| 3 _____ | 7 _____ |
| 4 _____ | 8 _____ |

Some of these things may be necessary if we are going to have a place for people. Some could be done elsewhere. Which of the habitat destructive items you listed probably could have been done someplace else?

- | | |
|---------|---------|
| 1 _____ | 4 _____ |
| 2 _____ | 5 _____ |
| 3 _____ | 6 _____ |



Now you can see why we need laws to protect estuarine resources. We call these conservation laws. A few activities that are controlled by conservation laws are:

Hunting
Fishing

Digging
Filling

People hunt some birds for food. No hunting is allowed during nesting season. Hunting in the fall reduces the number of those that have to find food through the cold part of winter. This means more food for those that are left. Sometimes reducing the population by hunting means less chance of starvation for those that are left. The number of days of hunting season and the daily bag limit can be adjusted so not too many birds are taken by hunters.

We have the laws we need to protect the estuarine resource but for the public benefit exceptions can be made like when we need an airport and there is no other place to build it.

People must always be careful to obey conservation laws and to see that exceptions are not made that are not necessary. Otherwise we lose the values provided by the estuary.

You can help conserve birds by not disturbing their nests when the birds are using them. Sometimes disturbing a bird on her nest will cause her to leave her eggs or babies. Never throw things at birds.

In Column 7 on your chart on Page 3 check the birds that people sometimes hunt for food.





IX. ACTIVITY: BIRD WATCHING.

Many people make it a hobby to try to find and identify as many different kinds of birds as they can. They make a list and keep records of the birds they see.

There are several books that can help you identify the birds you see. The most commonly used books are Birds of North America by Robbins, Bruun and Zim; A Field Guide to Western Birds by Roger Tory Peterson; and the Audubon Society Field Guide to North American Birds. These books have a place to check off birds you have seen.

When you use a field guide be sure to check in the guide the area where the bird occurs to be sure that it is likely to be found in your area. The list of local birds in this book may help.

The U.S. Forest Service has printed a checklist of birds of Southeast Alaska and also a checklist of birds of Prince William Sound. The U.S. Fish and Wildlife Service has a checklist of birds of Kodiak. These will be helpful to have.

If you enjoy looking for and identifying birds it is a great help to use binoculars or a telescope. Most birds fly away before you can get close enough to identify them with the naked eye, but with binoculars you can usually see most of the important field marks.

There are many good places to look for birds in your area. Right in town you can see many different types of birds in the cemetery, in yards, and by the boat harbors. Other good birdwatching areas are in the wetlands along the beaches, and in any of the forested areas.

It often helps to go out with a small group of birdwatchers because someone in the group may know some of the birds you have not yet learned to identify.

On page 40 is a list of 62 bird species that are along our coasts in the spring. Read this list and make a check ✓ by each bird you know. On your field trip see how many more you can check off.





BIRD WATCHING PLACES

Right in town in the residential areas you will find birds that like the open spaces of lawns surrounded by trees and shrubs to provide cover. Some birds feed on insects and worms, some on flower nectar, and some eat seeds and other vegetation. Birds you can find in town are:

Rufous Hummingbird	Varied Thrush
Barn Swallow	Ruby-crowned Kinglet
Tree Swallow	Myrtle Warbler
Steller's Jay	Wilson's Warbler
Chestnut-backed Chickadee	Oregon Junco
Winter Wren	Golden-crowned Sparrow
American Robin	

Down by the boat harbor and along the waterfront, you can find birds that eat fish, shellfish, marine invertebrates and other foods found in the marine and coast environment. Birds you can find at the waterfront are:

Pelagic Cormorant	Glaucous-winged Gull
Greater Scaup	Herring Gull
Barrow's Goldeneye	Bonaparte's Gull
Bufflehead	Pigeon Guillemot
White-winged Scoter	Marbled Murrelet
Surf Scoter	Northwestern Crow
Bald Eagle	Song Sparrow

The wetlands that have wide areas of grasses, mudflats and shallow inlets and ponds. This is one of the best areas to see birds. In the wetlands you can find:

Canada Goose	Greater Yellowlegs
Mallard	Dunlin
Pintail	Western Sandpiper
Green-winged Teal	Short-eared Owl
Common Merganser	Belted Kingfisher
Marsh Hawk	Water Pipit
Semipalmated Plover	Savannah Sparrow
Common Snipe	

In the uplands near rivers or glaciers you can find birds that like shrubby vegetation and birds that like freshwater streams and ponds.

Red-throated Loon	Dipper
Harlequin Duck	Barn Swallow
Bald Eagle	Myrtle Warbler
Spotted Sandpiper	Wilson's Warbler
Arctic Tern	Pine Siskin

X. ADDITIONAL ACTIVITY.

Write a report about your favorite bird.

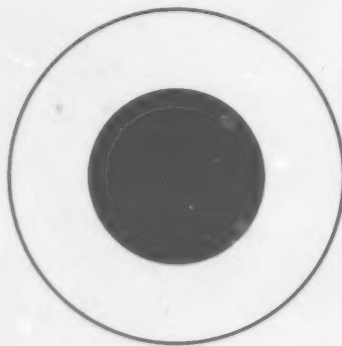
Name of bird _____

What does it look like? _____

Where does it live? _____

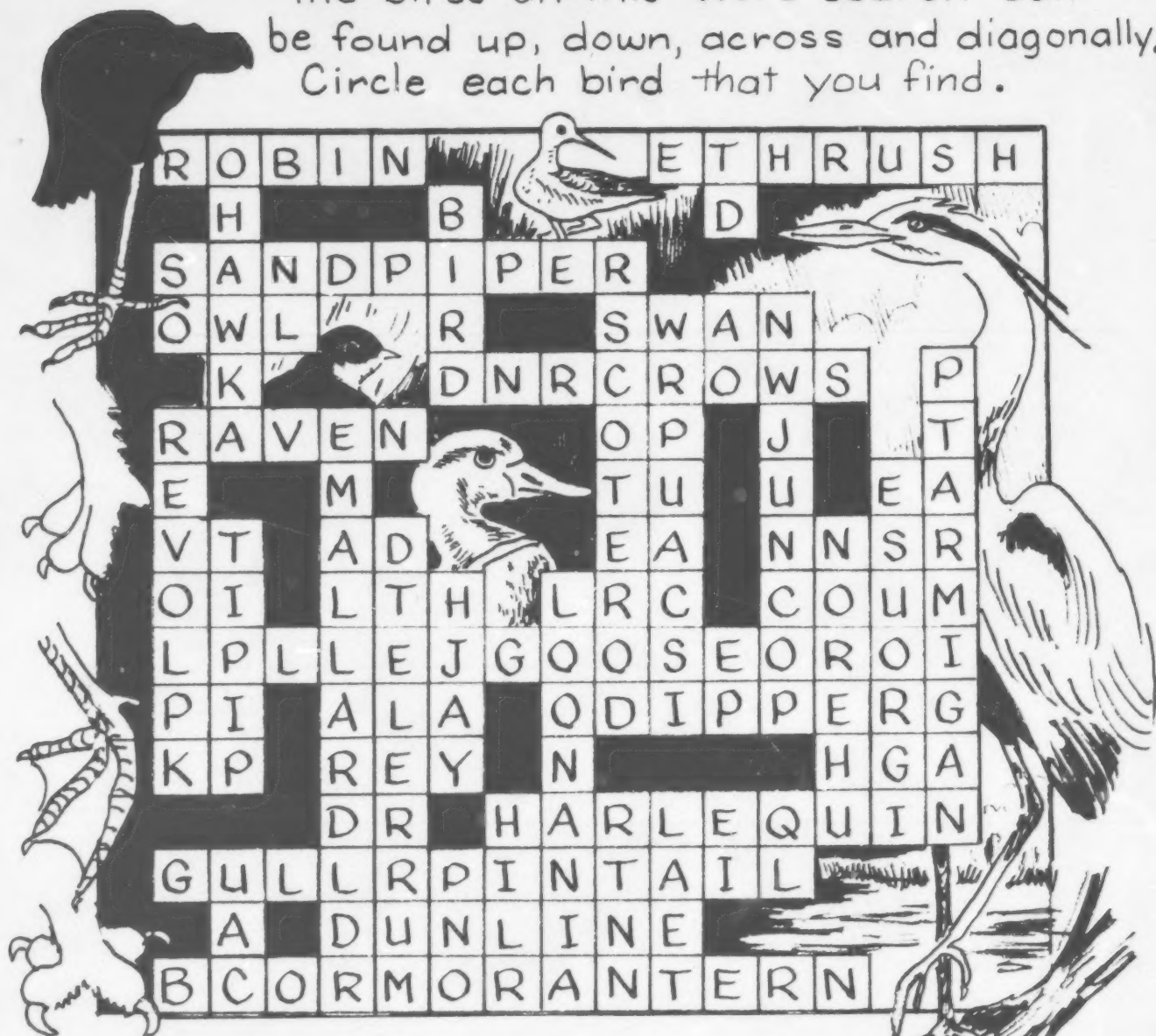
What other things have you learned about your bird?

Birds often smash into large house windows. Many birds are unnecessarily killed this way. Owl eyes in the window sometimes warn birds. Color the large circles yellow then cut out your owl eyes and put them up near the center top of your window with scotch tape.



Bird Word Search

The birds on this word search can be found up, down, across and diagonally. Circle each bird that you find.



Bald Eagle

Cormorant

Loon

Murrelet

Goose

Sanapiper

Robin

Teal

Harlequin

Mallard

Pintail

Scaup

Raven

Thrush

Owl

Swan

Gull

Tern

Dipper

Crow

Junco

Pipit

Dunlin

Heron

Jay

Grouse

Ptarmigan

71

Plover

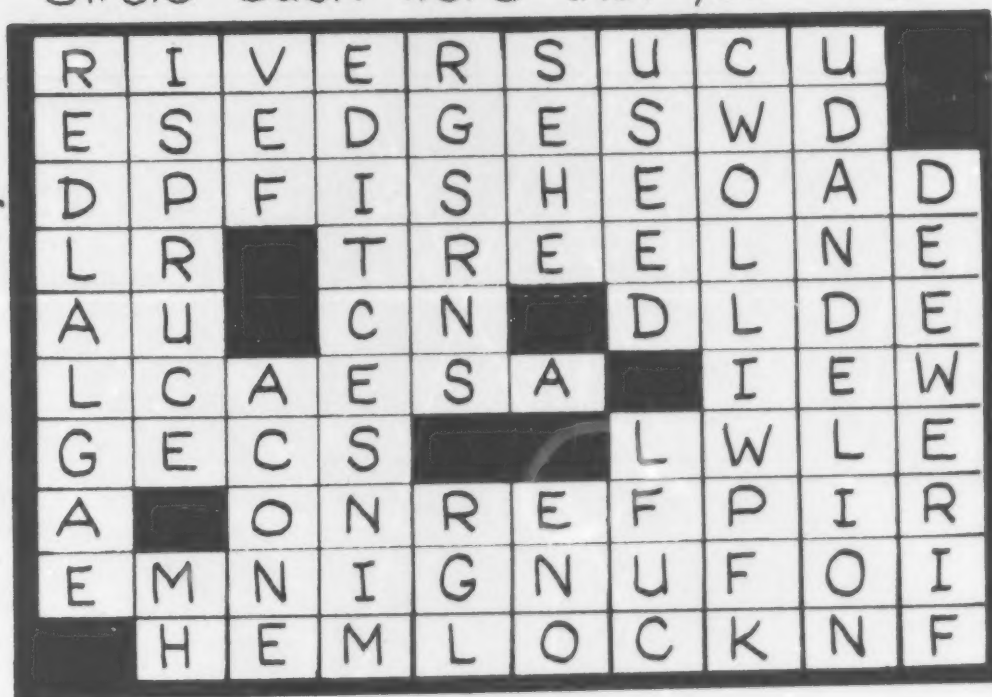
Hawk



Bird Habitat Word Search

There are twenty (20) things in this puzzle that can be found on the wetlands. Words can be found up, down, across, and diagonally.

Circle each word that you find.



River

Tide

Fish

Sedge

Alder

Spruce

Insect

Tree

Moss

Plant

Fern

Fungi

Sea

Willow

Fireweed

Algae

Hemlock

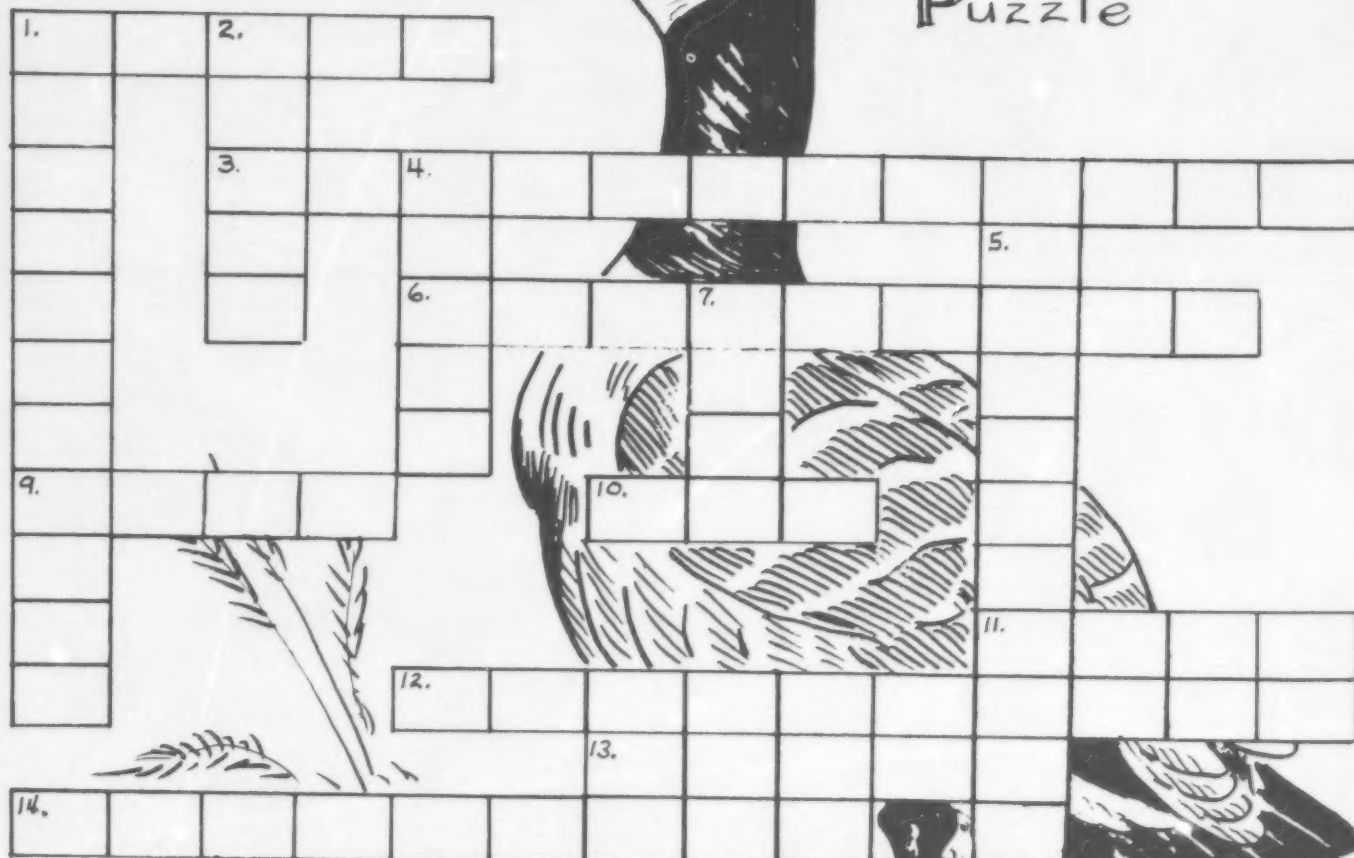
Cone

Dandelion

Seed

Bird

Crossword Puzzle



Bald Eagle
Blackbird
Bufflehead

Barn
Crow
Canada

Hummingbird
Heron
Kingfisher

Robin
Swan
Ptarmigan

Owl
Raven
Varied Thrush

Across

1. Largest bird on the list that wades.
3. Looks like a robin with black band on chest.
6. Black medium sized perching bird.
9. Swallow with rusty breast.
10. Bird of prey with large eyes.
11. Largest waterfowl.
12. Smallest duck.
13. Our National Bird.
14. Has feathers on feet that act like snowshoes.

Down

1. Smallest perching bird.
2. Largest black bird.
4. Common perching bird with red breast.
5. Medium sized perching bird whose name tells what he eats.
7. Black garbage eating bird, smaller than a raven.
8. Goose with white cheek.

CHECKLIST OF SOUTHEAST ALASKA'S MOST COMMON BIRDS IN SPRING (Seaweed)

Make a check mark by each bird you see during your bird study or through the summer.

Note - some of these birds have different plumage in winter and occur in different habitats then (see your bird book or SE list).

The habitats listed are best places to see these birds, but they can occur in other places.

The "winter home" column shows general range in the eastern Pacific area. Some of these occur elsewhere in winter. Those listed for "Coastal Alaska" stay all winter.

See your bird book for several hundred more species that are sometimes seen in Southeast Alaska.

	Your Check List	Bird	Size	Feet	Bill	Habitat	Most Distinguishing Characteristics	Winter Home
BIRDS THAT SWIM	↓							
<u>SEA BIRDS</u>								
		☐ Cormorant, Pelagic	L	Swim	Long hooked	Salt water	Black, upright	Coastal AK to B.C.
		☐ Guillemot, Pigeon	M	Swim	Pointed	Salt water	Black, white side patch	Coastal AK to Cal.
		☐ Loon, Red-throated	L	Swim	Pointed	Freshwater usually	Grey, red throat	Coastal AK to Cal.



☐ Murrelet, Marbled

M

Swim

Small,
Pointed

Salt water

Small, mottled
brown

Southeast
AK to Cal.

WATERFOWL



☐ Bufflehead

ML

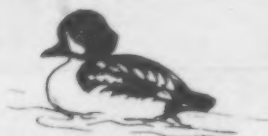
Swim

Wedge
shape

Salt water

Smallest duck,
black and white

Coastal AK
to Mexico



☐ Goldeneye, Barrow's

L

Swim

Wedge
shape

Salt water

Black and white

Coastal AK
to Cal.



☐ Goose, Canada

VL

Swim

Wedge
shape

Water,
wetlands

White cheek
patch

Coastal AK
to Cal.



☐ Green-winged Teal

L

Swim

Wedge
shape

Fresh water,
salt water

Small duck, green
wing patch

Cal. to
Mexico



☐ Harlequin

L

Swim

Wedge
shape

Salt water,
streams

Blue body with
white streaks
(male)

Coastal AK
to Cal.



☐ Mallard

L

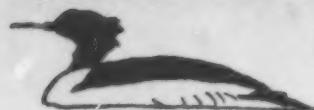
Swim

Wide,
flat

Wetlands

Green head,
grey back

Coastal AK
to Mex.



☐ Merganser, Common

L

Swim

Long,
toothed

Water

Flat, reddish head,
white chest



☐ Pintail

L

Swim

Wide,
flat

Wetlands

Pointed tail

Cal., Mex.,
Hawaii



☐ Scaup

L

Swim

Wide,
flat

Salt water

Black, grey back

Coastal AK
to Mex.



☐ Scoter, Surf

L

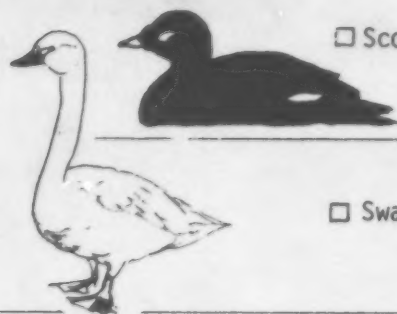
Swim

Wide,
flat

Salt water

Black, white
head patch

Coastal AK
to Mex.



☐ Scoter, White-winged

L

Swim

Wide,
flat

Salt water

Black, white
wing patch

Coastal AK
to Mex.

☐ Swan, Whistling

VL

Swim

Wide,
flat

Lakes, air
tidelands

Long neck,
white

California

GULL-LIKE BIRDS



☐ Bonaparte's

ML

Swim

Hooked

Beaches,
tidelands

Black head,
small gull

Wash. to
Mexico



☐ Glaucous-winged

L

Swim

Hooked

Beaches, dump,
fish streams

Large gull,
grey wings

Coastal AK
to Mex.

☐ Herring

L

Swim

Hooked

Beaches, dump,
fish streams

Large gull, black
on wing tips

Coastal AK
to Mex.

☐ Tern, Arctic

ML

Swim

Hooked

Tide flats,
glacier

Orange bill and
feet, forked tail

Chile to
Antarctica

BIRDS THAT WADE

☐ Dipper

M

Grip

Sharp,
pointed

Streams

Grey, bobs body
up and down

Coastal AK

☐ Dunlin

S

Long
legs

Long,
pointed

Beach,
mudflats

Rusty back,
black belly

Coastal AK
to Mex.

☐ Heron, Great Blue

VL

Long
legs,
toes

Long,
pointed

Beach,
fish streams

Bluish color,
tall

Coastal AK

☐ Killdeer

S

Long
toes,
legs

Pointed

Beach, fish
streams

Two black stripes
on breast

Wash. to
Central
America



☐ Oystercatcher, Black	M	Long toes, legs	Long, flat	Islands, reefs	Black with orange bill	Coastal AK
---	---	-----------------------	---------------	-------------------	---------------------------	------------

☐ Plover, Semipalmated	S	Long toes, legs	Medium pointed	Mudflats, beach	One black stripe on breast	Cal. to S.America
---	---	-----------------------	-------------------	--------------------	-------------------------------	----------------------



☐ Sandpiper, Spotted	S	Long toes, legs	Medium pointed	Mudflats, sandy places	Spots on breast	Cal. to S.America
---	---	-----------------------	-------------------	---------------------------	-----------------	----------------------

☐ Sandpiper, Western	S	Long toes, legs	Medium pointed	Mudflats, beach	Very small	Cal. to S.America
---	---	-----------------------	-------------------	--------------------	------------	----------------------



☐ Snipe, Common	S	Long toes, legs	Long, pointed	Swampy places	Long bill, short legs	Coastal AK to S.America
--	---	-----------------------	------------------	------------------	--------------------------	----------------------------



☐ Yellowlegs, Greater	S	Long toes, legs	Long, pointed	Mudflats, beach	Yellow legs	Cal. to S.America
--	---	-----------------------	------------------	--------------------	-------------	----------------------

BIRDS OF PREY

☐ Eagle, Bald	VL	Grasp	Sharp, hooked	Coast, salmon streams	Adults have white head and tail	Coastal AK
--------------------------------------	----	-------	------------------	--------------------------	---------------------------------------	------------

☐ Hawk, Marsh

L

Grasp Sharp,
hooked

Tide flats

White above
tail

Central
America



☐ Owl, Short-eared

L

Grasp Sharp,
hooked

Tide flats

Black patch near
bend of wing, no
visible ear tufts

Coastal AK
to Mexico

PERCHING BIRDS: VERY LARGE



☐ Raven, Common

VL

Perch Strong,
pointed

Town

All black

Coastal AK

45

PERCHING BIRDS: LARGE

☐ Crow, Northwestern

L

Perch Strong,
pointed

Beach

All black,
smaller than
raven

Coastal AK

☐ Grouse, Blue

L

Scratch Seed

Forest

"Hooter"

Coastal AK



☐ Ptarmigan, Rock

L

Scratch Seed

Alpine

Black tail,
white in winter

Coastal AK

84

85

PERCHING BIRDS: MEDIUM



☐ Blackbird, Rusty

M

Perch
Seed

Pointed,

Tide flats

Rusty black,
Light eyes

Cal. to
Gulf of Mex.



☐ Grosbeak, Pine

M

Perch Seed

Forest, ash
trees in town

White wingbars

Coastal AK
to Oregon



☐ Jay, Steller's

M

Perch Seed

Forest,
estuary

Blue, crest,
noisy

Coastal AK



☐ Kingfisher, Belted

M

Perch Pointed

Beach, lakes

Crest, grey,
white neck ring

Coastal AK



☐ Robin, American

M

Perch Pointed,
seed

Yards,
wetlands

Red Breast

California

☐ Starling

M

Perch Pointed

Town, parks

Short-tailed,
dark

Coastal AK
around towns



☐ Thrush, Varied

M

Perch Pointed,
seed

Yards,
wetlands

Black band on
redbreast

B.C. to
California



☐ Waxwing, Bohemian	M	Perch	Pointed, Seed	Yards, forest	Yellow chest, red on wingtip and tail	Coastal AK to Cal.
--	---	-------	------------------	------------------	---	-----------------------

PERCHING BIRDS: SMALL



☐ Chickadee, Chestnut-backed	S	Perch	Pointed	Forest, yards	White eye mask	Coastal AK to Oregon
---	---	-------	---------	------------------	----------------	-------------------------



☐ Hummingbird, Rufous	VS	Perch	Pointed	Yard, on flowers	Male is orange, brown, bright orange throat	Mexico
--	----	-------	---------	---------------------	---	--------



☐ Junco, Oregon	S	Perch	Seed	Yard, forest	Black head, white outside tail feathers	Coastal AK to Mex.
--	---	-------	------	-----------------	---	-----------------------



☐ Kinglet, Ruby Crowned	VS	Perch	Insect	Forest	White eye ring, red crown	To California
--	----	-------	--------	--------	------------------------------	------------------



☐ Pipit, Water	S	Perch	Insect	Wetland	Bobs, grey feathers, white sided tail feathers	Oregon to Mexico
---------------------------------------	---	-------	--------	---------	---	---------------------



☐ Redpoll, Common	S	Perch	Insect	Forest	Red on Head and chin, nervous	Coastal AK to Cal.
--	---	-------	--------	--------	----------------------------------	-----------------------



☐ Siskin, Pine

S

Perch Seed

Yard, forest

Yellow on side wings

Coastal AK



☐ Sparrow, Golden-crowned

S

Perch Seed

Yard, wetland

Gold stripe on top of head

B.C. to California



☐ Sparrow, Lincoln's

S

Perch Seed

Wetland

Pale yellow-brown under eye

To Cal.

☐ Sparrow, Savannah

S

Perch Seed

Wetland

Faint yellow above eye

Wash. to Cal.



☐ Sparrow, Song

S

Perch Seed

Wetland

Black spot on breast

Wash. and Oregon



☐ Sparrow, White-crowned

S

Perch Seed

Wetland

Two white stripes on head

B.C. to Mexico

☐ Swallow, Tree

S

Perch Insect

Yard, Wetland

White breast, soars

Cal. to Central America



☐ Barn Swallow

S

Perch

Insect

Yard, barn,
wetland

Rusty breast,
forked tail

South
America



☐ Warbler, Myrtle

S

Perch

Insect

Forest,
wetland

Yellow on side
of wing and
above tail

Oregon to
Panama



☐ Warbler, Wilson's

S

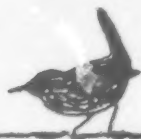
Perch

Insect

Forest,
wetland

Yellow with
black hat

Mexico to
Panama



☐ Wren, Winter

VS

Perch

Insect

Forest

Tail stands
up, brown

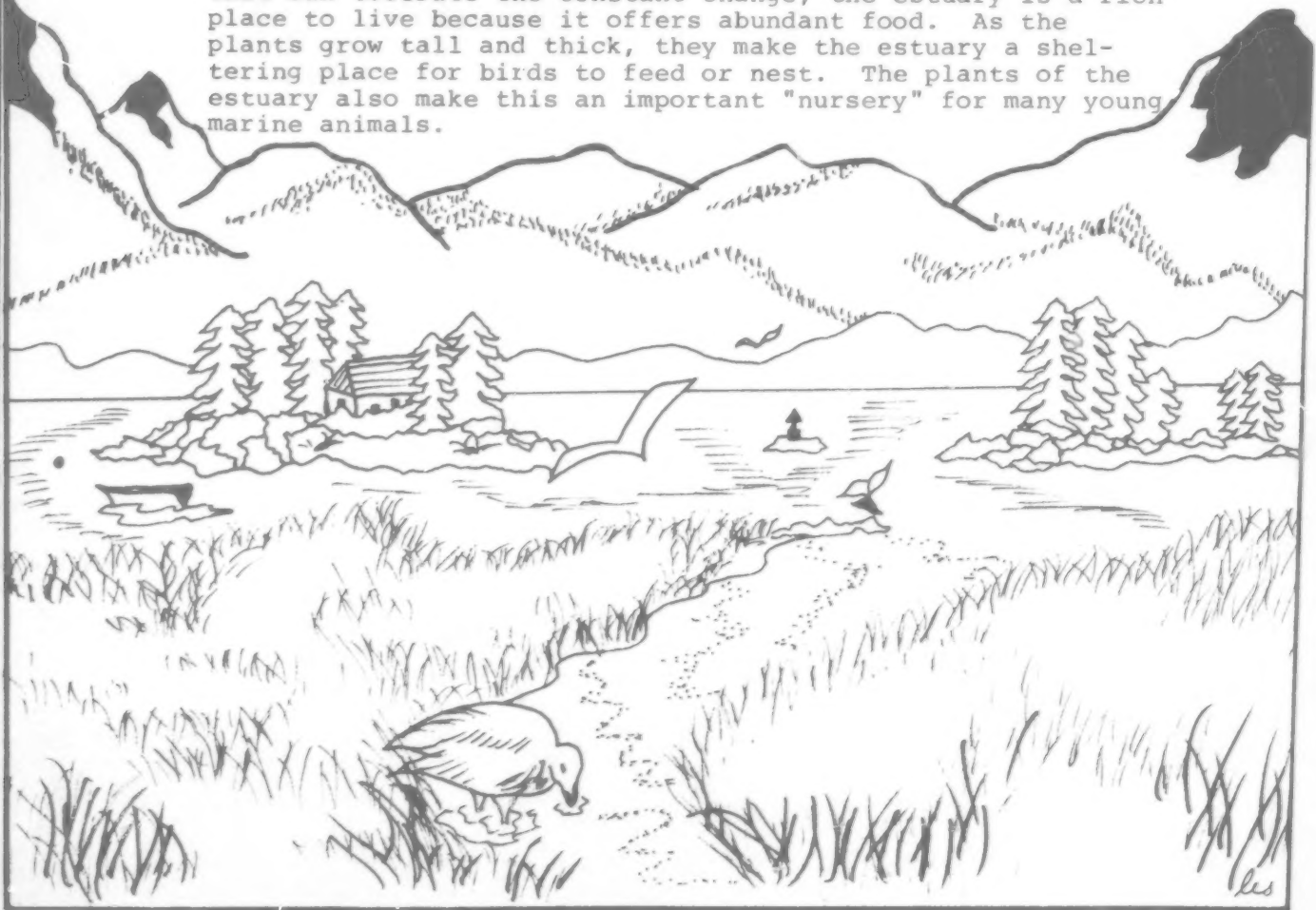
Coastal AK

ESTUARY: WORKSHEET 1

ESTUARY (es choo er e): a place where freshwater meets the sea, often an inlet or the wide mouth of a river.

In an estuary, freshwater from the land and salt water from the sea mix. The mixture of the two kinds of water changes as the rivers, the sea, and the weather change. Sometimes heavy rains or the melting ice of spring bring great amounts of freshwater to the estuary. Sometimes the rivers carry silt or debris or man's wastes into the estuary. Everytime the tide changes the mixture of salt and fresh water in the estuary changes; when the tide is high, there is more salt water in the estuary and when the tide is low, there is less. Sometimes the freshwater flows over the top of the heavier salt water, but storms, winds, currents or changes in temperature may cause the salt water and freshwater to mix.

Because the degree of salt in the water of the estuary is always changing, plants and animals that live there must be able to stand these changes. To the plants and animals that can tolerate the constant change, the estuary is a rich place to live because it offers abundant food. As the plants grow tall and thick, they make the estuary a sheltering place for birds to feed or nest. The plants of the estuary also make this an important "nursery" for many young marine animals.



TESTING YOURSELF

Draw a line under the right answer or fill in the blank.

1. In an estuary, saltwater mixes with _____.
2. From the story you can tell
 - a. the estuary is a bad place for young marine animals.
 - b. the estuary is a sheltering place for birds to feed or nest.
 - c. the estuary never changes.
3. The story as a whole is about
 - a. the ocean.
 - b. freshwater rivers.
 - c. where freshwater meets the sea.
 - d. freshwater and saltwater don't mix.
4. Plants and animals living in estuaries
must be able to stand change. YES NO DOES NOT SAY
5. The estuary offers abundant food
for plants and animals. YES NO DOES NOT SAY
6. What word in the first paragraph means a place where freshwater
meets the sea? _____

SAY & KNOW GETTING READY TO READ

Draw a line under the right answer or fill in the blank.

- | | | | | |
|------------|--|-----------------|----------|------------|
| MICROSCOPE | 1. Another word for multiply | DOUBT | INCREASE | HIDE |
| FIGHT | 2. To rot is the same as | DECAY | FIGHT | BEND |
| DECAY | 3. To have many different things is to have a | LEAF | VARIETY | TINY |
| HIDE | 4. _____ is something that helps you see tiny animals. | LEAF | COUNT | MICROSCOPE |
| GENERATION | 5. A word for food material | HOPE | NUTRIENT | SEA |
| LEAF | 6. Your parents and grand parents are a different | _____ than you. | | |
| NUTRIENT | | GENERATION | EDGE | LEAF |
| VARIETY | | | | |
| INCREASE | | | | |

ANSWERS

Lesson I

1. Freshwater
 2. B - the estuary is a feeding place for young marine animals.
 3. C - where fresh water meets the sea
 4. Yes
 5. Yes
 6. Estuary
-

ANSWERS

SAY & KNOW

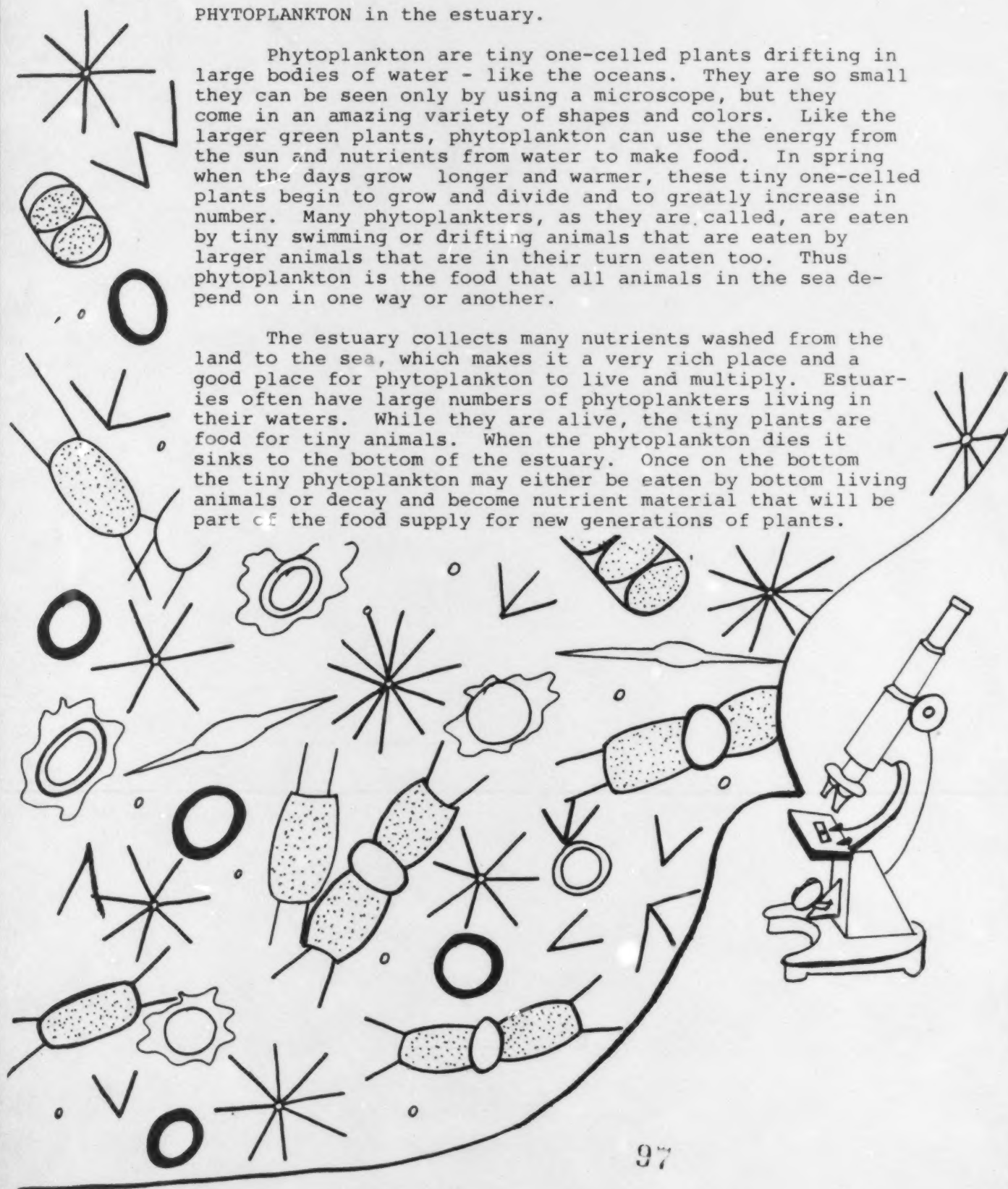
1. increase
2. decay
3. variety
4. microscope
5. nutrient
6. generation

ESTUARIES: WORKSHEET 2

PHYTOPLANKTON in the estuary.

Phytoplankton are tiny one-celled plants drifting in large bodies of water - like the oceans. They are so small they can be seen only by using a microscope, but they come in an amazing variety of shapes and colors. Like the larger green plants, phytoplankton can use the energy from the sun and nutrients from water to make food. In spring when the days grow longer and warmer, these tiny one-celled plants begin to grow and divide and to greatly increase in number. Many phytoplankters, as they are called, are eaten by tiny swimming or drifting animals that are eaten by larger animals that are in their turn eaten too. Thus phytoplankton is the food that all animals in the sea depend on in one way or another.

The estuary collects many nutrients washed from the land to the sea, which makes it a very rich place and a good place for phytoplankton to live and multiply. Estuaries often have large numbers of phytoplankters living in their waters. While they are alive, the tiny plants are food for tiny animals. When the phytoplankton dies it sinks to the bottom of the estuary. Once on the bottom the tiny phytoplankton may either be eaten by bottom living animals or decay and become nutrient material that will be part of the food supply for new generations of plants.



TESTING YOURSELF

Draw a line under the right answer or fill in the blanks.

1. Phytoplankton are tiny _____ plants.
2. From the story you can tell
 - a. phytoplankton all look the same.
 - b. phytoplankton cannot be seen by a microscope.
 - c. phytoplankton are eaten by tiny swimming or drifting animals.
3. The story as a whole is about
 - a. one-celled animals
 - c. plants and animals in the ocean
 - b. one-celled plants
 - d. plants and animals in the estuaries
4. The estuary is a good place for phytoplankton to live.

YES
NO
DOES NOT SAY
5. Phytoplankton can use the energy from the sun and nutrients from water to make food.

YES
NO
DOES NOT SAY
6. What word in the first paragraph means one-celled plants?

SAY AND KNOW

GETTING READY TO READ

Draw a line under the right answer or fill in the blank.

- | | | |
|---|--|---|
| SOLID
MICROSCOPIC
PRODUCE
NOURISH
FIGHT
SIMILAR
APPEAR
VALUABLE
RELAX | <ol style="list-style-type: none"> 1. Food will _____ you.
STORM NOURISH 2. To come into view is to
SOLID FIGHT 3. Not useless means the same as
STORM VALUABLE 4. If you make something you _____ it.
PRODUCE FIGHT 5. If something looks almost the same it looks
FIGHT RELAX 6. You need a microscope to see _____ animals.
MICROSCOPIC SOLID | SOLID

APPEAR

RELAX

STORM

SIMILAR

RELAX |
|---|--|---|

ANSWER
Lesson II

1. one-celled
 2. C - phytoplankton are eaten by tiny swimming or drifting animals.
 3. B - one-celled plants
 4. Yes
 5. Yes
 6. Phytoplankton
-

ANSWERS
SAY AND KNOW

1. nourish
2. appear
3. valuable
4. produce
5. similar
6. microscopic

ESTUARIES: WORKSHEET 3

Carex, an important plant in the estuary.

Carex is called a sedge. That means that its stem is triangular and solid, instead of hollow. Many kinds of Carex can be found in Alaska. They grow along roads and in yards as well as in estuaries.



One kind of Carex living in estuaries, grow very rapidly and may reach a height of three feet or more during a growing time of four or five months! This Carex begins to grow in the spring and stops by mid-summer. Then in the fall and winter, it starts to bend over, to fall, and to decay. Finally the Carex disappears as it changes from plant to nutrients and return to the rich mud of the wetlands. The following spring new green shoots will appear.

While Carex shoots are alive, many small animals may live on them and some probably feed on the tall plant. When the new growth begins to decay, microscopic animals feast on it. The nutrients from the decaying Carex nourish new sedges and grasses, or they will find their way into the waters of the estuary to become food for phytoplankton.

Carex and the other plants of the wetlands produce more plant material than any other kinds of plants of similar size growing in the areas. If they are measured in energy or food value, wetlands may produce four times as much plant material as a rice field and twice as much as a corn field. This means if we want to talk about how valuable different kinds of land are in producing food for the animals of the world, wetlands must rank among the most important.



TESTING YOURSELF

Draw a line under the right answer or fill in the blank.

1. Carex changes from plant to _____.
 2. From the story you can tell
 - a. Carex grows very rapidly.
 - b. Carex keeps growing all year long.
 - c. Carex grows a hollow stem.
 3. This story is about
 - a. plants living in wetlands.
 - b. animals living in estuaries.
 - c. how animals reproduce.
 4. Bacteria feast on Carex.
- YES NO DOES NOT SAY
5. Wet lands cannot produce four times as much plant material as a rice field.
- YES NO DOES NOT SAY
6. What word means a stem is triangular and solid? _____
-

SAY AND KNOW

GETTING READY TO READ

Draw a line under the right answer or fill in the blank.

- | | | | |
|-------------|---|-------------|-----------|
| AMAZE | 1. If something has no meaning it is | | |
| FRESH | FRESH | MEANINGLESS | OCEAN |
| MEANINGLESS | 2. To surprise someone is to | | |
| OCEAN | AMAZE | ROCK | BLOOM |
| MIXTURE | 3. To have many parts is to be | | |
| BLOOM | OCEAN | COMPLEX | BLOOM |
| INDIRECTLY | 4. When something is not the same it is | | |
| COMPLEX | FRESH | ROOT | DIFFERENT |
| | 5. When you put different things together you get a | | |
| | MIXTURE | OCEAN | ROCK |
| | 6. _____ is the same as roundabout. | | |
| | INDIRECTLY | BLOOM | FRESH |

ANSWERS

Lesson III

1. nutrient
 2. a. Carex grows very rapidly
 3. a. plants living in wetlands
 4. yes
 5. no
 6. sedge
-

ANSWERS

SAY AND KNOW

1. meaningless
2. amaze
3. complex
4. different
5. mixture
6. indirectly

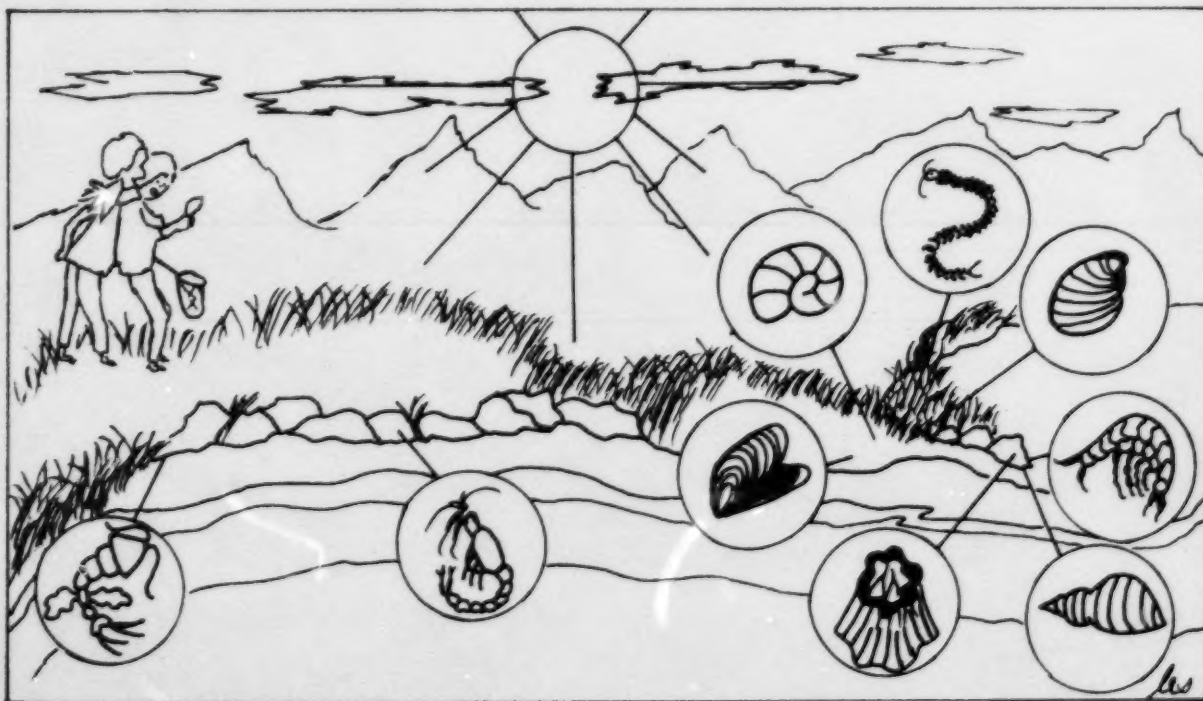
ESTUARY WORKSHEET 4

INVERTEBRATES in the Estuary.

Invertebrates are animals without backbones. Insects, sea stars, clams, crabs, worms -these and many more are among the common invertebrates.

In an estuary live many different kinds of invertebrates and each of them has its own set of needs for the kind of place it has to have to be able to live. Some invertebrates in the estuary can live only where there is fresh water; others can live only where there is salt water; still others must have water that is a mixture of fresh and salt. Some invertebrates live in mud, some only under rocks, other prefer the roots or stems of the marsh grasses and sedges. Discovering where many different kinds of small invertebrates are found in the estuary will help us understand how complex and amazing the natural world can be.

Crustaceans, bivalves and worms are types of invertebrates living in estuaries. Each of these small lives may seem meaningless but they are part of a important food chain. Small invertebrates eat tiny plants and animals. Larger animals like fish and ducks eat the small invertebrates. Together they are steps of a food chain and are very important - even indirectly in feeding us.



TESTING YOURSELF

Draw a line under the right answer or fill in the blank.

1. Crustaceans, bivalves and worms are types of _____.
2. From the story you can tell
 - a. invertebrates live in many different places.
 - b. invertebrates all live in the mud.
 - c. invertebrates don't like the water.
3. This story as a whole is about
 - a. invertebrates eat ducks.
 - b. invertebrates are an important part of a food chain.
 - c. invertebrates don't fit in the food chain.
4. Crustaceans are worms living in the ocean.

YES	NO	DOES NOT SAY
-----	----	--------------
5. Many different kinds of invertebrates live in the estuary.

YES	NO	DOES NOT SAY
-----	----	--------------
6. What word in the first paragraph names an animal without a backbone? _____

SAY AND KNOW

GETTING READY TO READ

Draw a line under the right answer or fill in the blanks.

- | | |
|--|---|
| INCREASE
BIOLOGIST
STOMACH
EXAMINATION
STREAM
SPAWN
IMPORTANT
MONTH | 1. To have great value is to be very
IMPORTANT STREAM FOUND
2. To get bigger in size is to
RIVER INCREASE MONTH
3. Someone who studies plants and animals is called a
MONTH BIOLOGIST EGG
4. It means to look closely
EXAMINATION STREAM TIME
5. When fish lay their eggs it is called
SPAWN FOUND STREAM
6. Everything you eat goes into your
STOMACH MONTH FOUND |
|--|---|

ANSWERS
Lesson IV

1. invertebrates
 2. A - invertebrates live in many different places
 3. invertebrates are an important part of a food chain
 4. no
 5. yes
 6. invertebrate
-

ANSWERS
SAY AND KNOW

1. important
2. increase
3. biologist
4. examination
5. spawn
6. stomach

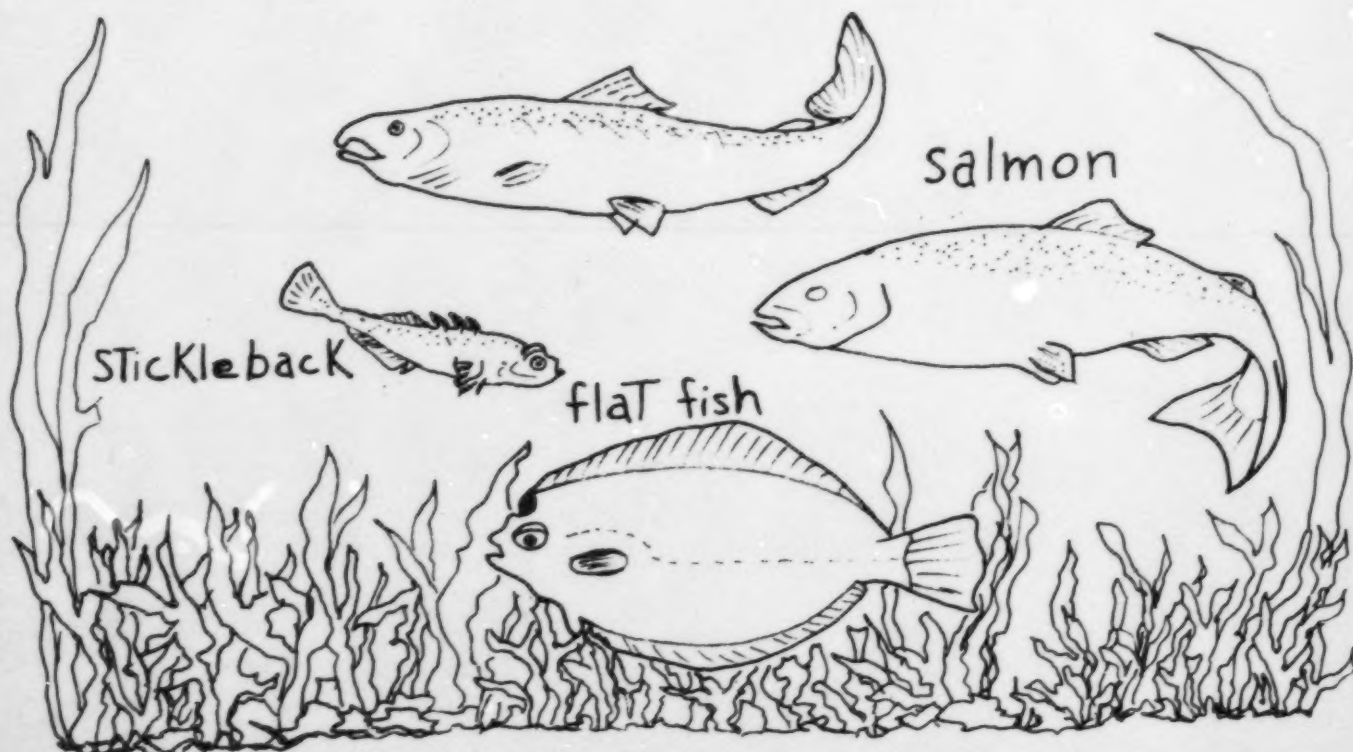
ESTUARY WORKSHEET 5

FISH in the Estuary.

Many fish live in estuaries. Some spend their whole lives there, but others may be there for only a short time before they move to other waters. In either case, estuaries are important to these fish because of the huge supply of food that can be found there.

A small fish called stickleback and some of the flat fish spend most of their lives in the estuaries. Flat fish like to lie partly buried on the vast mud flats of the estuaries. Both fishes feed on the many invertebrates living in the estuaries.

To salmon, estuaries are very important. Salmon spend part of their lives in salt water and part in freshwater. Adult salmon live in the open ocean but move up into rivers and streams to spawn (lay their eggs), and then die. The eggs they deposit develop into new salmon which move down the streams, rivers and into the ocean - just like their parents before them. When the young salmon, called "fry", are in the estuary, they feed heavily, gaining size and energy to prepare them for their life in the ocean. Biologists have studied how much salmon fry feed and found some fry increase their weight by more than ten times during a month in the estuary. Examination of the stomachs of salmon fry has shown these fish feed on insects, small worms, mollusk eggs, crustaceans and their young.



TESTING YOURSELF

Draw a line under the right answer or fill in the blank.

1. Many fish live in the _____.
2. From the story you can tell
 - a. salmon live in freshwater and saltwater.
 - b. salmon eat other fish in the estuary.
 - c. salmon die in the ocean.
3. This story, as a whole, is about
 - a. what crustaceans feed on.
 - b. fish living in estuaries.
 - c. fish in the ocean.
4. Salmon lay their eggs then die.

YES NO DOES NOT SAY
5. Salmon spend all their life in fresh water.

YES NO DOES NOT SAY
6. What word in the third paragraph is a name for young salmon?

SAY AND KNOW

GETTING READY TO READ

Draw a line under the right answer or fill in the blank.

- | | | | |
|-----------|---|---------|--------|
| RESIDENT | 1. Natural materials are called | | |
| TOXIC | ANCHOR | ORGANIC | WATER |
| ORGANIC | 2. When a bird does not travel it is | | |
| BLOOM | RESIDENT | BLOOM | WRAP |
| SILT | 3. To kill by preventing oxygen is called | | |
| SUFFOCATE | SUFFOCATE | ANCHOR | SHELL |
| ANCHOR | 4. At the mouth of a river you may find | | |
| WRAP | SILT | HUNT | WRAP |
| | 5. To remove by passing through is to | | |
| | ANCHOR | FILTER | HUNT |
| | 6. _____ means the same as harmful | | |
| | TOXIC | BLOOM | ANCHOR |

ANSWER SHEET

Lesson V

1. estuaries
2. A - salmon live in fresh water and salt water.
3. B - fish living in estuaries
4. yes
5. no
6. fry

ANSWERS

SAY AND KNOW

1. organic
2. resident
3. suffocate
4. silt
5. filter
6. toxic

ESTUARY: WORKSHEET 6

MAN AND THE WETLANDS

Wetlands are of great importance to man's environment. Water washing from the land often carries with it silt, toxic materials, and organic materials, but wetlands have microscopic organisms that can break these materials down and stop them from doing harm to the environment. Wetlands also serve as filters, trapping valuable nutrients from the soil or water and making them available for new plant growth. Finally, wetlands trap silt and stop it from traveling further into the estuary where it would cause problems with life forms by blocking the light plants need for growth or covering fish and invertebrate eggs which would then suffocate for lack of oxygen.

Wetlands may look like wastelands of tall, grass-like plants, but they really are a very important part of our environment. They serve as a buffer zone between land and sea, are a nursery or home for many marine animals as well as plants. They also provide food and cover for both resident and migrating birds.



TESTING YOURSELF

Draw a line under the right answer or fill in the blank.

1. Name something of great importance to man's environment.
2. From the story you can tell
 - a. wetlands stop water from traveling into the estuary.
 - b. wetlands trap valuable nutrients from the soil.
 - c. wetlands are wastelands.
3. The story, as a whole is about
 - a. grass-like plants.
 - b. birds that live in the estuary.
 - c. wetlands effect environment.
4. Fish and invertabrates need oxygen to live.

YES	NO	DOES NOT SAY
-----	----	--------------
5. Wetlands contain microscopic organisms that break down toxic materials.

YES	NO	DOES NOT SAY
-----	----	--------------
6. What word in the second paragraph means to travel each season?

ANSWERS

Lesson 6

1. wetlands
2. B - wetlands trap valuable nutrients from the soil
3. C - wetlands effect environment
4. yes
5. yes
6. migrating

ESTURARY WORKSHEET 7

INVERTEBRATES in the Estuary.

Here is a list of eight kinds of invertebrates you can expect to find on a field trip to an estuary. Try to find these and record where you found them. Add to the list any additional kinds of invertebrates you discover!

<u>Who</u>	<u>What</u>	<u>Where</u>
foraminifera	microscopic animals with tiny shells composed of chambers, the last of which is open	collect some sand or sand/shell debris from the intertidal zone and examine it under a microscope
mysids	shrimp-like crustaceans with long slender abdomens, or "tails"	watch for them in shallow pools or near a creek mouth under rocks along the edge
copepods	crustaceans, often with a broad, flattened body and large antennae	look at the cut bank of a stream-especially where roots are exposed
amphipods	crustaceans, often flattened side to side, with a curved body covered sometimes by a shiny, hard outer skeleton	at creek mouths, under rocks, there are many different species-can you separate them from each other by how they look and where they live?
barnacles	crustaceans that live within a hard covering attached permanently to rock, etc.	marine animals. (See how close to the freshwater source they can live.)
mussels	bivalves; the most common are the blue mussels with large purple-blue, sometime brown, shells	marine animals. (Are they more or less tolerant of fresh water than barnacles?)
clams	bivalves; small, white clams called <u>Macoma</u> live in estuaries-most common out here are the pink ones	although live animals usually buried in sand or mud, empty shells may be found
polychaetes	segmented worms, usually with many "feet"	dig for them in mud where the water is saltier than fresh
littorinas	small snails, often solid dull color, sometimes with color bands.	high intertidal zone on rocks.



Foraminifera



Mysids



Copepods



Amphipods



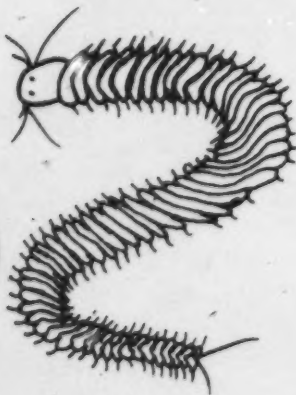
Barnacles



Mussels



Clams



Polychaetes



Littorinids

"COMMON BIRDS OF SOUTHEAST ALASKA"

Slide - Tape Show**
and
Supplementary Materials

I. Slide Tape Show

Part 1: 20 minutes (need a 140 slide carousel) (# 1-111)

Part 2: 18 minutes (need standard (80) slide (# 112-163)
carousel)

II. Worksheets

1. 4th Grade Bird Study Worksheet.

To be used while the students are
viewing the Bird-Slide Tape Show,
"Common Birds of Southeast Alaska".

2. Precocial Birds (Canada Geese) and Vocabulary.

To be used before showing the Bird Slide
Tape Show to familiarize students with
the word, precocial.

3. Altricial Birds (Bald Eagle)

To be used before showing the Bird
Slide - Tape Show to familiarize
students with the word, altricial.

4. Vocabulary Sheets

To be used before and/or after the
Bird Slide - Tape Show

To be used with the 4th grade Bird
book, "Birds in the Alaska Coastal
Environment"

a. Birds and Their Bills or Beaks

b. Birds Can Walk

c. Do You Know

d. How Birds Get Food

e. Bird Beaks or Bills:

Activities

f. Activities: Bird Bills or Beaks

g. Activities: Bird Bills or Beaks

**Ed. note: This slide-tape show is available
from the South East Regional Resource Center,
538 Willoughby Avenue, Juneau, Alaska 99801.
(586-6086) You might also ask your local
librarian for "Estuaries, Part I and Part II"
by Elizabeth A. Daugherty.





4TH GRADE BIRD STUDY WORKSHEET

What single thing sets birds apart from all other animals?



1. Is it because they can fly? yes _____ no _____

2. Can anything else fly? yes _____ no _____

What? _____



3. Is it because they can build nests? yes _____ no _____

4. Can anything else build a nest? yes _____ no _____

What? _____



5. Is it because birds lay eggs? yes _____ no _____

6. Can anything else lay eggs? yes _____ no _____

What? _____



7. Is it because birds have feathers? yes _____ no _____

8. Do other things have feathers? yes _____ no _____



FOUR TYPES OF FEATHERS

1. _____

2. _____

3. _____

4. _____



How many feathers do these birds have?

1. Hummingbird _____

2. Chicken _____

3. Swan _____



SIX MAIN GROUPS OF BIRDS

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____



SIX MAIN TYPES OF FEET

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____





SIX MAIN TYPES OF BEAKS OR BILLS



1. _____

2. _____

3. _____

4. _____

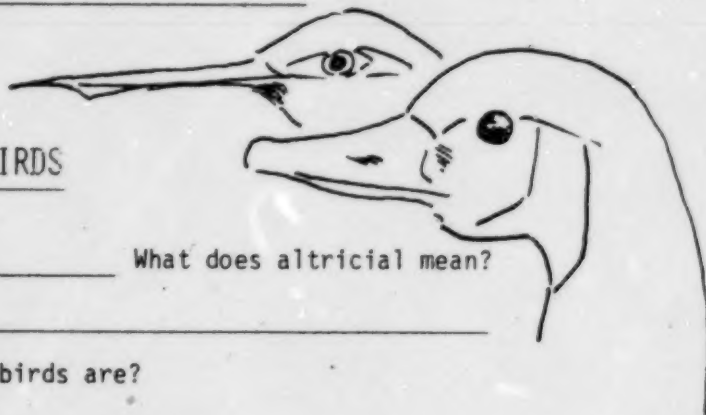
5. _____

6. _____



TWO TYPES OF BABY BIRDS

1. _____ What does altricial mean?



Two altricial baby birds are?

A. _____

B. _____



2. _____ What does precocial mean?

Two precocial baby birds are?

A. _____

B. _____



BIRD STUDY UNIT QUIZ



(Circle the correct answer)



Bird A

1. What group is this bird in?
 - a. Perching bird
 - b. Preying bird
 - c. Wading bird
2. What type of foot does it have?
 - a. Preying
 - b. Scratching
 - c. Climbing



3. What is the name of this bird?
 - a. Owl
 - b. Eagle
 - c. Hawk



Bird B

1. What group is this bird in?
 - a. Wading bird
 - b. Sea Bird
 - c. Waterfowl
2. What type of foot does it have?
 - a. Wading
 - b. Swimming or webbed
 - c. Preying



Bird C

1. What type of bill does it have?
 - a. Straining
 - b. Fish eating
 - c. Preying
2. What does this bird eat?
 - a. Fish
 - b. Seeds
 - c. Insects



Bird D

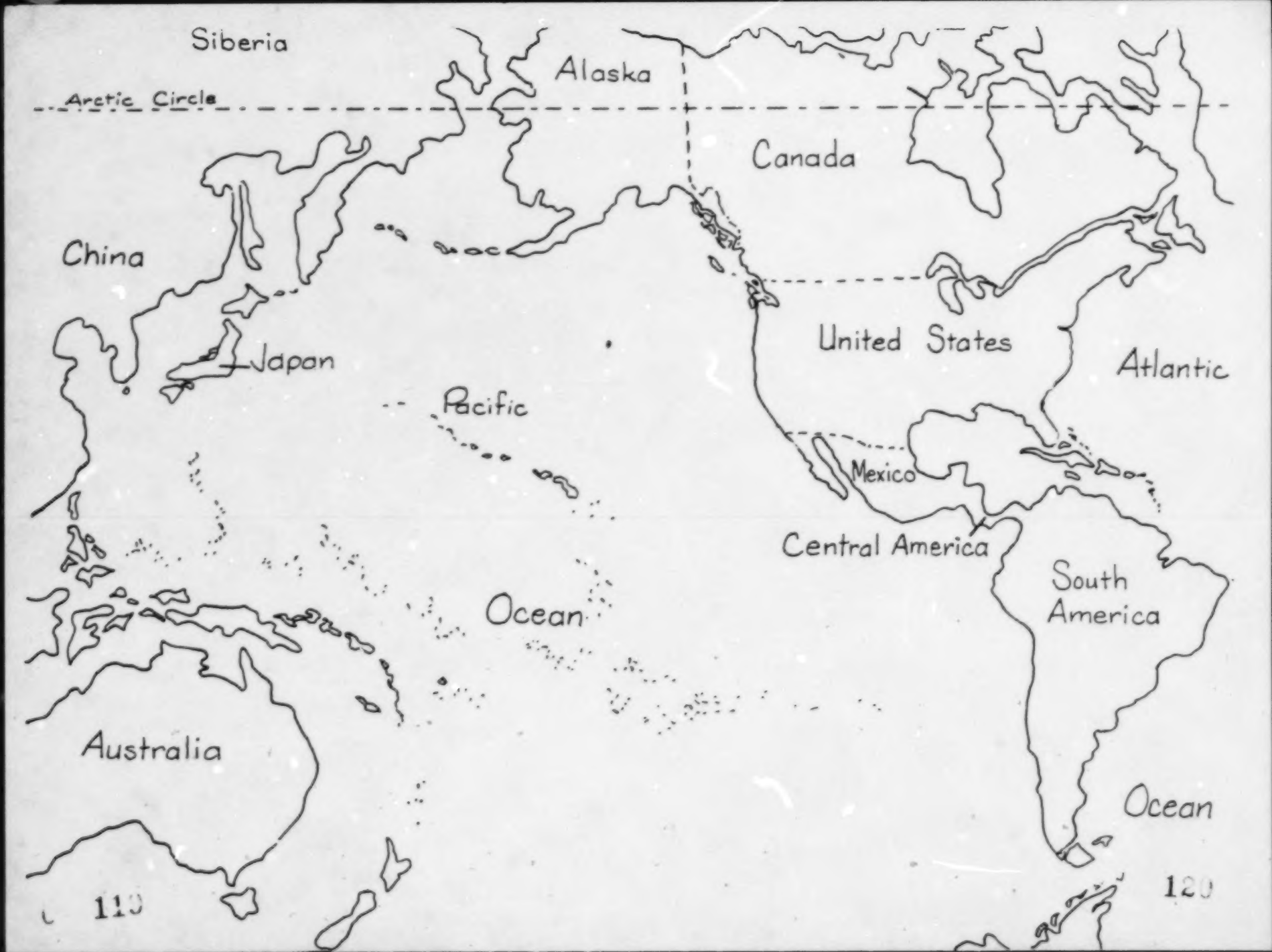
1. What is this bird's name?
 - a. Sparrow
 - b. Robin
 - c. Warbler
2. Do you think this bird migrates in winter?
 - a. yes
 - b. no



Bird E

1. What type of bill does this bird have?
 - a. Straining
 - b. Probing
 - c. Insect eating
2. Does this bird have altricial or precocial young?
 - a. altricial
 - b. precocial





Story - 4th Grade

Precocial Birds

Directions: Read the story. Check the meaning of the underlined words in the Vocabulary List.



CRACK!!! CRACK! The Canada Goose gosling, a precocial bird, cracks its way out of its shell with its egg tooth.

Soon, a small, wet head with large dark eyes is cracking out of the egg shell. In what seems like minutes, a once very wet gosling is walking slowly, then running and swimming. It is finding food and eating--ALL BY ITSELF. Soon there are five little, light-colored, downy-covered Canada Geese trailing along after the mother goose and the gander.

In mere hours, the goose pair and their brood are finding seeds, weeds, and grasses to eat. They are swimming in the ponds and lakes. The female is guiding her brood around and the male is hissing and flapping his wings and successfully keeping most everything away from his family.

Canada Geese story continued;

The male goose has been protecting his mate and their young since the female began setting on the eggs almost five weeks ago.

This Canada Goose pair made their nest in an opening in the roots of a large spruce tree. The tree helped protect the nest from predators and harsh weather. First, the female goose dug a little hollow in the tree roots. Then she pulled some down from her feathers and lined the hole with it. She also gathered moss and grasses. Finally, she settled down in the nest and laid her five eggs. She left the nest, only briefly, to eat and drink. During this time, the male was darting back and forth and hissing and flapping his wings in an effort to keep away predators.

In about four weeks, the goslings have all their feathers. In about six weeks, they are fully grown and look like their parents.



VOCABULARY LIST FOR PRECOCIAL BIRDS

Gosling - a young goose



Precocial - young that can swim, run, and feed themselves within hours after hatching. Some precocial baby birds are geese, ducks, chickens, seagulls, and shorebirds such as sandpipers, snipes, plovers and killdeer.

Egg tooth - a special hard spot on the upper part of the gosling's beak. The young goose or other precocial bird bangs the shell with its egg tooth until he cracks a hole big enough to get out of.

Downy-covered - a down-like covering on the baby bird. This keeps the young warm until the feathers grow in.

Gander - a male goose

Pair - two things. Like a pair of shoes or a pair of people.

Brood - young birds from a single nest.

Female - opposite of male. (girl, woman)

Male - opposite of female. (boy, man)

Mate - a friend, companion or one of a pair

Vocabulary list for Precocial Birds, continued;

Predators - animals that kill and eat another animal. The predators of the Canada Geese in this story include gulls, foxes, coyotes, wolves, bears, wolverines, eagles, ravens, and man.

Down - feathers that are the soft underfeathers of a bird. They help to insulate and keep the bird warm in even severely cold weather.

The Bald Eagle: An Altricial Bird

Out of dull-colored, rough textured, oval egg comes a very small young eaglet.

When first hatched this young bird is completely covered with long and thick down. It has long down on its head.

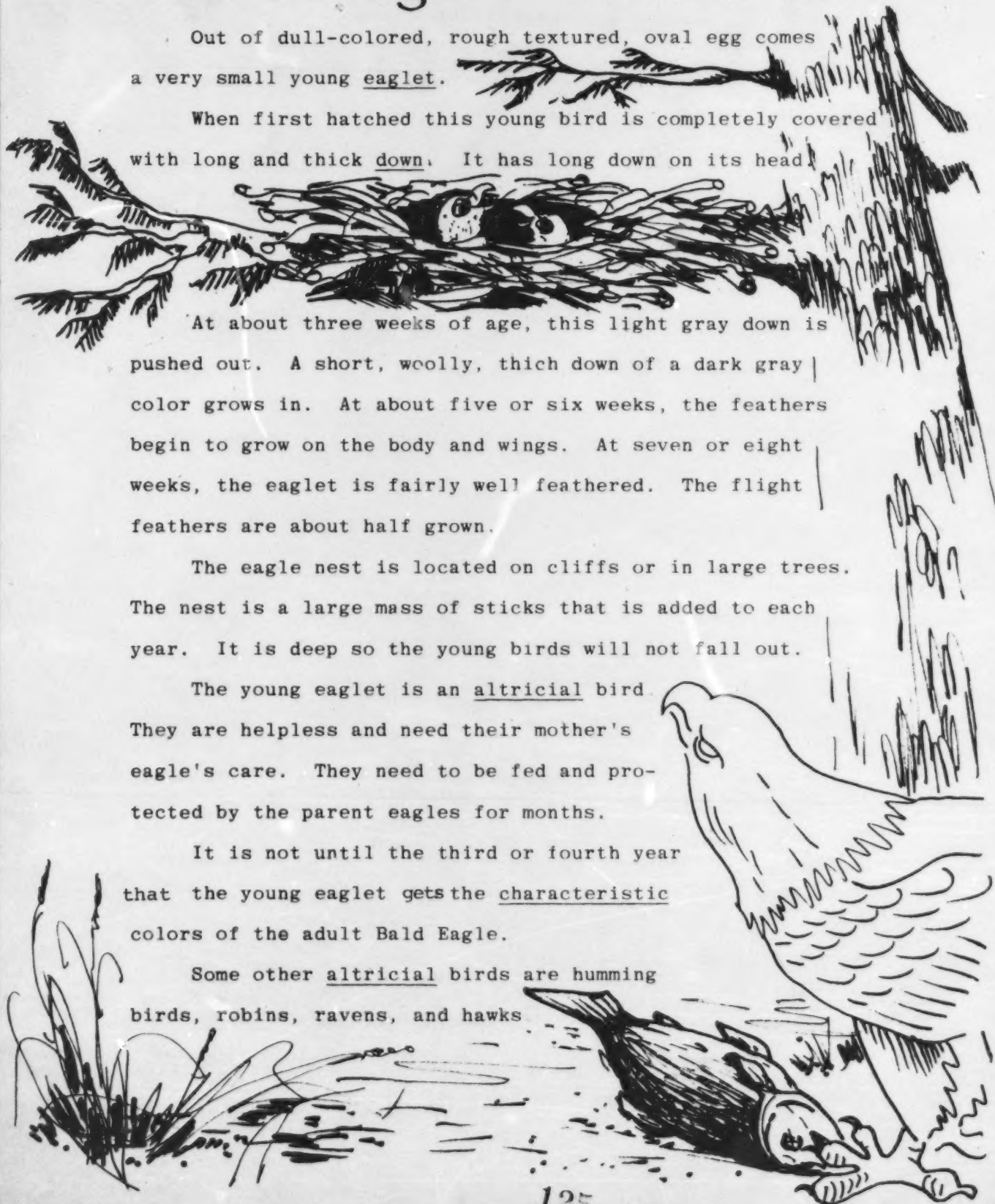
At about three weeks of age, this light gray down is pushed out. A short, woolly, thick down of a dark gray color grows in. At about five or six weeks, the feathers begin to grow on the body and wings. At seven or eight weeks, the eaglet is fairly well feathered. The flight feathers are about half grown.

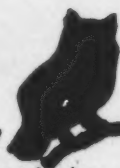
The eagle nest is located on cliffs or in large trees. The nest is a large mass of sticks that is added to each year. It is deep so the young birds will not fall out.

The young eaglet is an altricial bird. They are helpless and need their mother's eagle's care. They need to be fed and protected by the parent eagles for months.

It is not until the third or fourth year that the young eaglet gets the characteristic colors of the adult Bald Eagle.

Some other altricial birds are humming birds, robins, ravens, and hawks.



BIRDS AND THEIR BILLS OR BEAKS

(Worksheet to accompany "IV. Activity: Making a Living" from Birds in the Alaska Coastal Environment. Grade 4.)

Directions: Match the description of the bird's beak or bill with the name of the bird. You may use your bird book or a reference book to help you.

Short Strong Bill

Gulls

Long Spear-Like Bill

Ducks, Swans

Sharp Hooked Bill

Sandpipers, Snipes

Slender Bills

Eagles, Hawks, Owls

Long Pointed Bill

Sparrows, Grosbeaks,
Waxwings

or Probing Bill

Strong Slender Bill

Geese

Wide Flat Bill

Robins, Blackbirds

Chunky Flat Bill

Swallows, Warblers

Stout Hooked Bill

Herons, Kingfishers

BIRDS CAN WALK

(A worksheet to accompany "IV. Activity: Making a Living" from Birds in the Alaska Coastal Environment.)

DIRECTIONS: Draw a line from the type of bird foot to the name of the bird that has that foot. More than one bird will have the same kind of foot.

<u>TYPE OF BIRD FOOT</u>	<u>NAME OF BIRD</u>
1. SWIMMING OR WEBBED FOOT	Chickens
	Robins
2. WADING FOOT	Eagles
	Ducks
3. GRASPING OR PREYING FOOT	Herons
	Grouse
	Sparrows
4. PERCHING FOOT	Hawks
	Sandpiper
5. SCRATCHING FOOT	Geese
	Owls

DO YOU KNOW???



(Worksheet to accompany "IV. Activity: Making a Living" from Birds in the Alaska Coastal Environment. Grade 4)

Directions: Using the information found under IV. Activity: Making a Living in your bird book, complete the following sentences.

1. Sparrows, Grosbeaks and Waxwings have _____ bills for eating and cracking seeds.
2. Seagulls have _____ bills to help them catch and tear apart fish.
3. Geese have _____ bills for eating grass and roots.
4. Herons and Kingfishers have _____ bills for catching fish.
5. Ducks and Swans have _____ bills for eating pond weeds.
6. Eagles, Hawks and Owls have _____ bills for tearing animal food such as mice, rabbits and other rodents.
7. Robins and Blackbirds have _____ bills for probing for worms and picking up seeds.
8. Swallows and Warblers have _____ bills and wide mouths for catching insects.
9. Sandpipers and Snipes have _____ bills or probing bills for digging little animals out of the mud.

WORDS YOU MIGHT FIND HELPFUL

short strong

long pointed

stout hooked

long spear-like

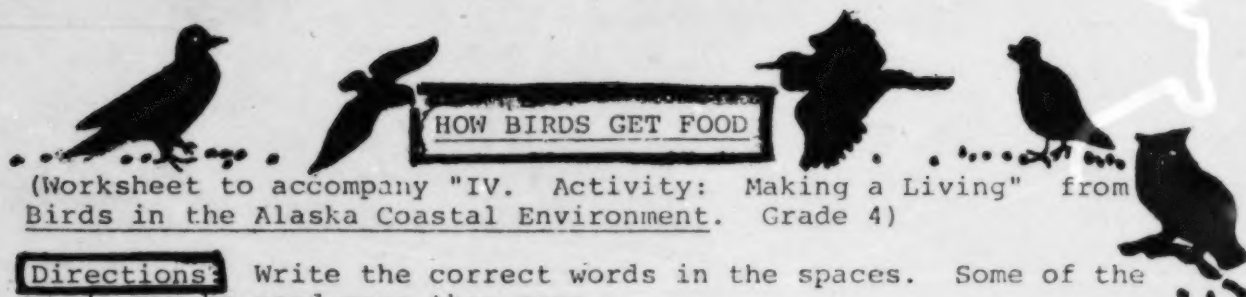
strong slender

sharp hooked

wide flat

slender

chunky flat



(Worksheet to accompany "IV. Activity: Making a Living" from Birds in the Alaska Coastal Environment. Grade 4)

Directions: Write the correct words in the spaces. Some of the words may be used more than once.

mud

roots

beak

bill

food

pond weeds

grass

teeth

animal food

little animals

worms

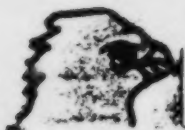
fish

insects

seeds



1. Birds do not have _____ to chew food.
2. Birds use their _____ or _____ to get food.
3. A short, strong bill is for eating and cracking _____.
4. A long spear-like bill is for catching _____.
5. A sharp, hooked bill is for tearing _____.
6. Slender bills and wide mouths are for catching _____.
7. A long, pointed bill is for digging _____ out of the mud.
8. A strong, slender bill is for probing for _____ or picking up _____.
9. A wide, flat bill is for eating _____ and sifting _____.
10. A chunky, flat bill is for eating _____ and _____.
11. A stout, hooked bill is used to catch and tear _____ and scavenge _____.



Bird Beaks or Bills ... Activities ...



(A worksheet to accompany the information found in "IV. Activity: Making a Living" from Birds in the Alaska Coastal Environment.)

Directions: Using your bird book as a guide, make pictures of the bills or beaks described in each box below.



SHORT STRONG BILL for eating
and cracking seeds

LONG SPEAR-LIKE BILL for catching
fish

SHARP HOOKED BILL for tearing
animal food

SLENDER BILLS and wide mouths for
catching insects

ACTIVITIES: BIRD BILLS OR BEAKS

(A worksheet to accompany the information found in "IV. Activity: Making a Living" from Birds in the Alaska Coastal Environment.)

Directions: Using your bird book as a guide, make pictures of the bills or beaks described in each box below.

LONG POINTED BILL or PROBING
BILL for digging little animals
out of the mud

STRONG SLENDER BILL for probing
for worms or picking up seeds

Draw your favorite bird.

ACTIVITIES: BIRD BILLS OR BEAKS

(A worksheet to accompany the information found in "IV. Activity: Making a Living" from Birds in the Alaska Coastal Environment.)

Directions: Using your bird book as a guide, make pictures of the bills or beaks described in each box below.

STOUT HOOKED BILL to catch and
tear fish and scavenge food

WIDE FLAT BILL for eating pond
weeds and sifting mud

CHUNKY FLAT BILL for eating
grass and roots

STEPS TO ORGANIZING A SEA WEEK IN YOUR COMMUNITY

- I. Familiarize yourself with the Sea Week curriculum and introduce it to other interested teachers and parents.
- II. Catalog the resources in your area. Where are the good beaches? When are the good low tides? Are there any agency, hatchery, or museum personnel that would be available as speakers and/or for field trips?
- III. Draw up a well-thought out plan for Sea Week and present it to your administrators for approval.
- IV. Talk to teachers in the upper grades about having some of their students accompany you on your field trips. Brief them ahead of time as to the activities you'll be doing.
- V. Make up a calendar of when speakers will talk, which movies will be shown, and when each class will take their field trips. By arranging two field trips near one another in location, or by having the second class come to the beach when the first field trip of the day is leaving, gas (and energy) can be saved by having fewer bus trips.
- VI. Invite the whole community to participate - parents, chamber of commerce, governmental agencies, native corporations, fishermen, etc. Parents can assist with field trips; businesses might display student artwork. If community organizations are interested, the week can become a Festival of the Sea, with boat tours, movies, speakers, games, and dances. Contact your local paper about featuring Sea Week with a photo and story - beforehand, during, and afterwards! Radio stations might want to interview field trip leaders - or read stories that students have written.
- VII. Spend an entire week studying the amazing ocean! Math problems, writing assignments, spelling words - can all relate to our marine environment. Show your students the wonder of sea life!

SUGGESTED FIELD TRIPS

In planning field trips for your class two things should be considered: 1. The emphasis in Sea Week studies at your grade level. 2. The available community resources.

Consider visiting a place - beaches, docks, vessels (fishing, pleasure, ferry, barge, tour ship, Coast Guard), cold storage plant, canneries, supermarket, government research facilities, hatcheries. Museums, private collections and stores might be considered for indoor trips. Arrangements might be made to watch someone at work - fisherman, biologist, or Coast Guard personnel. If your students have an opportunity to visit another community you might include Sea Week activities in your itinerary or might include the entire trip around them.

In planning any trip, if possible arrange for knowledgeable persons to accompany your group. The involvement of interested parents is also valuable.

FOURTH GRADE

- I. Beach - A trip oriented to bird observations as well as to other sea life.
- II. Estuary -
 - A. Field trip oriented to birds in the estuary is outlined in the Student booklet Birds in Alaska's Coastal Environment.
 - B. Field trips oriented to a study of the estuary are suggested in the unit.
- III. School grounds or adjacent areas - observe birds in your immediate surroundings.
- IV. Museum - Study mounted birds and historic uses of birds for food, clothing, decoration.

WHAT TO DO ON THE BUS

Put together a checklist of objects (or use the one that follows) that the students may see at the beach. During the bus ride, students can circle the name (or picture) of each object that they think they will be seeing during the field trip. At the beach, they can check off the objects they actually saw, and estimate or count how many they saw. A Juneau teacher makes her checklists into a small book, with a pencil attached by yarn, and gives each pupil a sandwich bag in which to store his/her checklist.

bus	_____	cow	_____
can	_____	raven	_____
fish	_____	sheep	_____
tree	_____	driftwood	_____
gull	_____	boat	_____
buoy	_____	moose	_____
anemone	_____	dock	_____
whale	_____	starfish	_____
seaweed	_____	house	_____
crab	_____	airplane	_____
bottle	_____	fisherman	_____
jellyfish	_____	limpet shell	_____
sand flea	_____	sea urchin	_____
mussel	_____	porpoise	_____

Conservation may be defined as the "wise use" of our natural resources. It is not the non-use of them, but rather a use that comes after careful thought has been given to the reasons and consequences of that use.

It is perhaps trite to say that with increasing population pressures, the ever-increasing need for raw materials, for recreational facilities, for homesites, etc., pressures increase on a natural environment that may previously have been untrammelled and in no need of someone to protect it from total alteration. Here in Alaska, particularly, the residents of the State are faced with making many immediate far-reaching decisions about the natural environment of our State. What man's impact on it will be and if and how that impact should be limited or controlled are some of these decisions.

Conservation, practically, comes down to a few important principles:

1. Every living thing, as well as non-living thing, has a place and function in the balance of existence on the surface of this planet, whether or not we happen to know what its precise niche is. "Everything is connected with everything else." "Everything affects everything else." Destruction of one species, useless and unimportant though that species may seem to our ignorance, can have wide-reaching repercussions.
2. Natural resources are exhaustible. Populations which drop below a critical threshold cease to reproduce and the species plummets into extinction. Energy resources on earth are not renewable. Extinction of living species and exhaustion of non-living resources are natural processes. Trilobites went extinct before men appeared on the scene. Volcanoes spew noxious gases into the air. Nevertheless, the speed with which man, especially 20th century man, is destroying or using up extant life and resources is astronomical compared to natural processes.
3. Since man is an intelligent being, he can, if he will, desist from extinguishing life and exhausting the resources of the earth. Man can practice conservation without denying himself a full and enjoyable life. His reason for using resources wisely may be an idealistic appreciation of all that nature has and is, or it may be a realization that our tomorrows will be poorer unless wisdom regulates usage of our goods.¹

For school children studying Alaska's marine life, conservation involves a few simple, yet extremely important principals:

1. DO VISIT THE BEACH AND ENJOY YOUR TIME THERE BUT WHEN YOU LEAVE, LET THE AREA BE THE SAME, OR BETTER, THAN YOU FOUND IT.
2. IF YOU TURN OVER A ROCK TO SEE WHAT IS HIDING UNDER IT, TURN IT BACK OVER WHEN YOU HAVE FINISHED. (What lives there may depend for survival on the exact kind of micro-habitat that exists under that rock.)

¹ Reef and Shore. Hawaii Nature Study Program for Elementary School Children, p. 4.

3. IF YOU PICK UP ANIMALS FOR CLOSER VIEWING, DISTURB ONLY THE ONES YOU WANT TO LOOK AT, HANDLE THEM CAREFULLY, THEN REPLACE THEM WHERE YOU FOUND THEM. SEA CREATURES CAN LIVE OUTSIDE OF THE WATER ONLY BRIEFLY. A PAN OR BUCKET OF SEAWATER WILL ALLOW CLOSER EXAMINATION AND REDUCE STRESS ON THE ANIMAL. KEEP THE CONTAINER OUT OF DIRECT SUNLIGHT AND REPLACE THE WATER IF IT BEGINS TO WARM. HANDLE FISH WITH WET HANDS TO PRESERVE THEIR PROTECTIVE SLIME AND IN HANDLING CRABS AND JELLYFISH - WATCH OUT FOR STINGERS AND PINCHERS. PICK CRABS UP FROM THE BACK AND SUPPORT THEIR UNDERSIDE WITH THE PALM OF YOUR HAND. DON'T TOUCH JELLYFISH.
4. IF YOU WANT TO USE LIVE MATERIALS IN THE CLASSROOM AFTER THE FIELD TRIP TO THE BEACH, TAKE ONLY WHAT YOU WILL NEED, TAKE CARE TO KEEP IT ALIVE, AND RETURN IT TO THE BEACH WHEN YOU ARE FINISHED WITH IT.
5. NON-LIVING BEACH MATERIALS MAY BE COLLECTED BUT USE MODERATION HERE, TOO. IF MATERIALS ARE FOR CLASS USE, HAVE A PROJECT IN MIND BEFORE YOU BEGIN COLLECTING AND THEN GATHER ONLY WHAT YOU WILL NEED. YOU MAY WANT TO GATHER DRIFTWOOD, STONES, BITS OF POLISHED GLASS. UNLESS YOU ARE A SECOND GRADE TEACHER, HOWEVER, PLEASE COLLECT ONLY A FEW, IF ANY, EMPTY SHELLS LEAVING THESE MATERIALS FOR THE SECOND GRADERS WHOSE ONLY SEA WEEK BEACH AND CLASSROOM ACTIVITY IS STUDYING THEM.

A CHECK LIST
FOR
A FIELD TRIP TO THE BEACH

You the teacher:

1. Be sure you are personally familiar with the beach to which you and your class are going. If you have not been there before, take a bit of time after school or on the weekend to go to that beach and walk it carefully. By being familiar with it yourself, you can anticipate what your students will be able to see and do there.
2. Check carefully on all bus arrangements for your class. Be sure that a bus is scheduled for you and be aware of the delivery and pick-up times.
3. Arrange for adequate adult supervision. Usually there is no problem in finding parents willing to go along. Often junior or senior high school students may also be available and, if they are taking biology or other related science courses, they can be very helpful. One older student or adult for every five or six children would be a good ratio in terms of safety, control, and learning.
4. Give careful thought to what you will do with your time at the beach. The beach is an exciting place just to explore, but some thought and directions given to the activities to take place will make the experience richer and more profitable for students and you, too.
5. Meet - or at least talk by phone - with your volunteers before the field trip to acquaint them with your plans for the outing. Be sure that each of them knows specifically what you would like each to do. Recommend that they attend appropriate training workshops and provide them with information from this guide or elsewhere.
6. Well in advance of the beach trip itself, begin preparing your students for their experiences there. The better prepared they are, the more successful the field trip will be.
7. Letters should be written to all parents, including permission slips, so that parents know about the activities in which their children will be involved.
8. Collect and ready all materials you will need for the field trip - buckets, pans, binoculars, camera, whatever it is you need. You might consider bringing or arranging for some kind of snack at the beach - a big bag of gorp (M & M's, raisins, salted peanuts, etc.) always makes a hit and a snack can serve

to reorganize matters at the beach and create a natural (though slightly contrived) change of pace and focus. (see the suggested time plan that follows.) Be sure to take along a supply of bandaids - or better yet, a small first-aid kit - just in case there is a need for it.

9. Plan the trip ahead, but allow for flexibility. If a whale is breaching just off shore while you are trying to teach the life and ways of a barnacle, your students will not be absorbing much of your lecture. Be prepared to take advantage of those special events that occur so often along our shores.

The students:

1. Involve them in preparing for the field trip as much as possible.
2. Explain to them any rules for field trip conduct. Stress especially the fact that the beach is a special environment and a fragile one whose beauty comes from the LIVING plants and animals to be found there. Impress upon them the need to respect the life forms they will see, to leave the beach as nearly like they find it as possible and not to collect or molest live beach animals unless you, the teacher, have very specific and well thought out needs for limited quantities of live animals and materials for use in further teaching processes and have requested the students help you gather materials.
3. A quick talk about safety at the beach would not be out of place - the need for proper clothing, care to be taken on rocks that are slippery when wet, what to do in case of injury, always keep an eye on the tide to be sure you are not stranded or lose gear to the rising waters, etc.
4. If a class project is planned for the beach time, help students to prepare or gather materials they will need to take with them.

BOTH teacher and students:

BE PROPERLY DRESSED. It is always difficult to predict what the weather will be in coastal Alaska but there is often a good chance that there may be rain. Be sure everyone knows that he or she should come dressed warmly and prepared for rain if that prospect seems at all likely. Wearing layers of clothes always makes sense - a short sleeved shirt, then something with long sleeves, topped by a sweater or warm jacket and something water and wind-proof. Foot gear is important. Layer socks for maximum warmth and wear RUBBER boots if possible. Carrying a back pack is a good idea for students and teachers alike. It leaves your hands free, lets you store away layers of clothes you want to shed or don't need at the moment and is a good place to keep the snack you and/or the students have decided to bring along.

SUGGESTED ON-SITE ORGANIZATION

The beach is an exciting place on your first visit there or your five hundredth and the most normal and natural thing to do on the beach is to walk - or run - along the shoreline to see what is there for the finding. If your class has been working hard on sea related studies and has carefully outlined what they want to do with their time at the beach, then perhaps all students will set right to work with whatever tasks have been outlined beforehand. But, if a less structured approach seems to be in order, you might try the following idea...

Part I

If, before the beach experience, you have been working in the classroom with the students on the particular area of marine knowledge outlined for your grade level, then the students should have a good idea of particular concepts or kinds of life or situations they might look for at the beach. Students could have the first half of the time at the beach to apply their knowledge in a free kind of framework. That is, for example, if you are a second grade teacher and have been studying shells with your students, give them the first part of their time at the beach to see how many different kinds of shells they can count, or give them some other similar kind of task that they can carry out and at the same time still be free to explore other aspects of the beach.

Part II

At the mid-point of your allotted time at the beach, gather the children together. Taking a bit of time out to open that big bag of gorp, or gathering for some other kind of snacking, works to draw everyone together, change the pace and focus.

After the quick energy break is a good time to have the students sit down quietly and talk about what they have seen or to have adult helpers work in small groups with children to share further discoveries or knowledge about materials found on the beach. As an example, if you are a first grade teacher who has been studying marine animals with your class, each adult helper might have been assigned to gather in a bucket - with the children's help - examples of a particular group of animals during the first part of the time on the beach. Then, during the second half of the beach time, each adult and his or her bucket of materials might circulate from one small group of children to the next, encouraging them to touch, feel, observe certain characteristics or qualities of these particular animals.

Children need both to enjoy the beach just for the pleasure there is in being there and to grow in understanding the complex web of life and environmental factors that are at work there. If careful thought and planning have gone on well before the actual trip to the beach, there is every reason to believe that both these goals can be accomplished.

A LOOK AT THE BEACH

Any beach is as individual in its own way as are we who, as individuals can be distinguished from all other people. Just as each of us represents only one combination out of the many possible, so it is with beaches. A beach is a place where the sea confronts the land, and every aspect of that sea and that land edge is important in determining what the general appearance of that beach will be and what kinds of plants and animals will grow and thrive in that particular environment. Many factors combine to determine the personality of that unique and special place.

The Sea

If we think first about the water at the beach, we realize that there are several ways in which it can vary. To begin with, for example, those of us living in the Juneau area look out to waters that are relatively protected. That is, our beaches are not subjected to the open, powerful swells that are common on coast lines that abut the open ocean. Unlike conditions that might be found at Sitka, for example, the wave conditions along our beaches are always relatively mild and non-violent. Even in the Juneau area, however, local differences in topography influence the personality of the beach. Whether a particular beach area is a straight, uninterrupted stretch, a deep or shallow cove, or a jutting point will influence the force and effect of the waves upon the shore. Consequently, we might expect to find different kinds of life on a point, in a cove, or on a straight, uncomplicated shoreline because each species has a particular ability to withstand greater or lesser wave force.

We all know that the sea is salty but we may not all realize that the concentration of salt in sea water can be highly variable. In the open ocean, salt concentrations measure about 32 to 33 parts per thousand. In our inside waters around Juneau, the average salt concentration in main channels may be slightly less than that because of the greater influence of fresh water entering from streams and rivers. At the mouths of the streams and rivers themselves, where salt and freshwater mix, salt concentrations are very low. Because each kind of marine plant or animal has its own built-in tolerances to varying saltiness or freshness, these living populations vary with the salinity prevalent at a particular place.

THE SIZE OF PEBBLES

If you stand on a beach and look thoughtfully at it, one of the first things you will notice is its texture - whether it is sandy, gravelly, composed of cobbles, bedrock, mud or a combination of two or more of these. The nature of the beach is critical in determining what can live there. Let's examine each kind of substrate in turn to see what kind of life we might expect to find.

Mud

Mud can be anything from relatively porous sand-soil mix to the clay muck that sucks rubber boots right off your feet. If you look at the surface of this kind of substrate, you will be aware of little, if any, life. Here and there you may see the flexible tubes of mud dwelling worms sticking up an inch or so above the surface. Or you may see "cake decorations" left by other burrowing worms. Finally, you may be aware of the presence of clams by the squirts of water and the siphon holes in the mud. Digging with a shovel will reveal the various inhabitants of the mud in all their glory - fat, bulbous peanut worms: slender, earthworm-like nemerteans of various descriptions; many-legged annelid worms; and hardy bivalves.

Sand

Because sand is more porous than mud, it is a better surface for many burrowers, a better surface for a wider number of animals to live on and in. On a sand flat at low tide one may find starfish, sea urchins, and numerous kinds of crabs and snails. Some of these animals wander over the sand flats when they are submerged, scouring them for bits of food. Some crabs, like the Dungeness, tend to stay in sandy areas because of the methods of self-protection involves burrowing into the sand to hide. (Even when the sand is exposed, watch for depressions in the surface that mimic the shape of the crab's shell. By digging there, you may uncover a crab that stayed buried even as the water receded.) By looking for clam or cockle siphon holes, you will discover these common residents of sandy areas and by digging carefully you may unearth them.

Cobbles and Boulders

Obviously, the size of loose rocks on the beach may range from something just a bit coarser than sand up to boulders too large to be lifted. In general, the larger the general size of the rock pieces, the greater variety of life one might expect to find there. The more stable the hard surface is, the greater protection and anchors it can afford a resident plant or animal. Intertidal areas of cobbles or rocks are often most obviously serving as anchorages for marine plants (most common in the Juneau area, Fucus, the rockweed, the tough, ubiquitous, brown plant with the bulbous reproductive bodies that kids like to pop) and for barnacles and blue mussels that may cover certain rocks of sections of beach in great density. If you begin to look down among the beds of rockweed, barnacles, and mussels and UNDER cobbles and boulders, you will discover an amazing diversity of life forms. Small six-rayed starfish cling beneath medium sized rocks, often brooding clutches of eggs. Blennies up to six inches or so in length (one of the two most common intertidally discovered fish) hide under rocks. So do amphipods or sand fleas and tiny crustacean beach scavengers that quickly seek new cover when discovered under their protective rock. Clinging to the surface of the rocks may be limpets, chitons, sponges. Look for the latter particularly under overhangs of larger rocks.

Because of their ability to serve as anchors and because they offer so many protective niches, rocks on beaches afford some to the best looking places. Don't neglect to have along a magnifying glass so you can really see some of the tiny critters! Guaranteed that the more you look, the more you will see there! Just be very sure that after you turn over a rock to reveal its underside residents, that you replace it so the animals don't dry out and perish!

Bedrock

This is just as exciting a place to poke as cobbles/boulder areas and many of the same inhabitants can be found here - with two general kinds of exceptions. First, obviously this rock surface can't be turned over so the "rock and sand or mud residents" are not here. Second, it is in bedrock areas that you are most apt to find remnant puddles of water - tidepools - that may harbor lots of life, including small anemones with tentacles extended to trap food (they come in a wide variety of gorgeous color combinations), rock hard coralline algae that looks like hard, pink plaster but are actually living plants, tiny immature sculpins, and perhaps little shrimp. Be sure to look carefully in crevasses for sponges, starfish, and other creatures.

THE DISTANCE FROM THE WATER

Each species of marine plant and animal has a particular tolerance to being out of salt water. Some of them, for example, are never found intertidally because they have absolutely no tolerance for exposure to the effects of an air environment. Others can stand being out of salt water for extended periods of time, needing only to be wet by the sea on occasional very high tides. By looking at the beach in a section from its highest high water mark down to the water level on a low, low tide, you can quickly begin to see major differences in plant and animal populations.

The Highest Fringe

At the upper limits of the intertidal zone, least life forms are evident. You may notice that the rocks appear black here. This is because they are covered by a black encrusting lichen or by a blue-green algae that makes these rocks treacherous and slippery when wet. In these upper reaches, too, may be found the common tiny periwinkle - a fat, ridged snail that sometimes seems to pepper the rocks.

The Middle Zone

As you move down toward the water's edge on a low tide, you will be aware of obvious color bands or patches on the beach. There may be banding of Fucus, the common brown rockweed, and of blue-black mussels (the intertidal - and subtidal - bivalve that attaches itself by tiny threads to rocks and pilings and other surfaces), and barnacles. Here too you will begin to see limpets (the species of which are sometimes most quickly identified by how low or high they are found on the beach), amphipods, various starfish, tiny black sea cucumbers, and other forms of life there were not in evidence at higher levels.

The Lowest Zone

As you approach the water's edge, you will not find some of the plants and animals that were evident at higher levels. In general, however, the lower you go in the intertidal zone the greater the diversity of life forms you will find. Here you will find sea urchins, a wide variety of often large starfish, perhaps juvenile king crabs, large white or varicolored sea anemones (if they are out of water, these will look like squishy, uninviting blobs, but look out into the shallow waters to see the same animals in all their expanded glory), and the larger snails.

So...as you look at any particular beach for the first time, there is a great deal to think about. Remember that each part of the beach, each kind of surface type, each height from the water, each kind of topographical variation indicates what life may be found there. In general, it is advisable to spend the lowest part of the tidal cycle closest to the water's edge for in that way you will have the maximum amount of time to spend along the beach area that is revealed to us least often and which tends to harbor the greatest diversity of plants and animals.

If you can, acquaint your students with these obvious or subtle variations in the beach habitat for it will enrich their beach experience, too!!!

TIDES

Students can understand some basics about tides and should definitely learn that the height of the water on the beach varies with the stage of the tide and that maximum and minimum tidal levels vary each day.

Tides, in a very simplified kind of explanation, occur because of the gravitational pull of the sun and the moon on the earth. Just as the earth exerts gravitational force (why does an apple fall? why can't we step off into space?), so do these other two bodies. The force of the pull of the sun and moon on a particular place on earth depends on how directly they are in line with that place. The force they exert tends to pull the water away from the earth's surface on the side of the earth facing, thus causing a high tide. Because the relative position of the sun, earth, and moon are constantly changing in a cyclic rhythm, so are the tides.

Activities

Here in Southeast Alaska we experience a tidal cycle that consists of two unequal high tides and two unequal low tides each day. With some students in primary grades and all those in upper grades, you might sit down with a tide table and look at the numbers and explain what they mean. You might even make a simple chart of tide levels and of activities to coincide with various stages of the tide. For instance, it might be much easier to launch a boat when the tide is high but digging clams can best be done on the very lowest tide. Students might be shown the same beach at high and at low tide and through words or art work compare the differences.

Preparation for Field Trip

In preparing for the field trip, discuss tides with the students. Mention the need to be as close to the water as possible when the tide is at its lowest in order to see that strip of beach and the life that is there, for the water quickly comes in and covers it. Talk, too, about the need to be aware of the tide level and thus not to set a pack or bucket next to the water's edge and expect to find it there later if the tide is flooding.

As a teacher you need to be aware of the time of low tide when scheduling your field trip to the beach and in planning the activities that will take place there. The time of very lowest tide should be kept open for observation of what is to be found in the zone nearest the water. Activities such as taking a break for a snack or gathering around buckets to discuss and examine particular animals should occur when the tide is ebbing or flooding.

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Plus +++ check with agencies in your area, aquaculture associations, the U. S. Coast Guard, local corporations to see what publications they may have available.

OTHER LEARNING AIDS

The Alaska State Museum has multi-media learning kits available for use by Alaskan schools, including a Salmon kit. Priority use is given to bush schools. Write: Alaska State Museum, Pouch FM, Juneau, Alaska 99811.

Your school can order films through the Alaska State Film Library. Their marine science/oceanography listings are too numerous to mention, but some topics that are dealt with include: marine invertebrates, ocean currents, the beach, whales, life cycle of the salmon, mollusks, tide pool life, marine science careers, sea birds, octopus, the ocean as a food source, fishing techniques, the ecology of the ocean, and seacoast cultures.

The Smithsonian Institution is currently field testing a binder of estuary study activities (\$9.68). Activities include: Beachcombing, Mapping, Barnacles, Build A Trap, Fish Adaptations, Fish, Marsh Muck, Crabs, Water in Motion, Menace Oil Slick, Oil Spill Cleanup, and Estuary 3-D Board. For more information write:

SEA (Smithsonian Estuarine Activities)
Chesapeake Bay Center For Environmental Studies
Smithsonian Institution
P. O. Box 28
Edgewater, Maryland 21037

Posters on beach safety and pamphlets on tides, whales, crabs, and other marine topics are available from the Oregon State University Sea Grant Marine Advisory Program. For a catalog and price list (many are free) write:

Extension Communication-Marine Advisory Program
Oregon State University AdS 422
Corvallis, OR 97331

ALASKA SEA WEEK EVALUATION FORM

computer code numbers

1. Town or village _____

(1-4)

2. Grade level _____

(5)

3. Number of students involved _____

(6-7)

(8-10)

You may need to review your Alaska Sea Week materials to answer these questions.

4. How many classroom (indoor) activities and worksheets did you use from each book?

Book (Grade level)Number of activities

Discovery (K) _____

(11-12)

Sea Animals (1) _____

(13-14)

Shells (2) _____

(15-16)

Glacial & Intertidal Ecology (3) _____

(17-18)

Birds (4) _____

(19-20)

Fish (5) _____

(21-22)

Man's Influence on the Sea (6) _____

(23-24)

5. What is the total number of field (outdoor) activities used from the 7 books? _____ (25-26)

6. How many periods (1 hr. each) did your class spend on the Sea Week Program? _____ (27-29)

Please check the appropriate box to the right of each question.

	decidedly yes	yes	no opinion	no	decidedly no	
7. Were the Alaska Sea Week materials relevant to your curriculum?	(1)	(2)	(3)	(4)	(5)	(30)
8. Did the Sea Week materials motivate students to improve their math, reading, & writing skills?	(1)	(2)	(3)	(4)	(5)	(31)
9. Did the Sea Week materials upgrade your science program?	(1)	(2)	(3)	(4)	(5)	(32)
10. Did students enjoy the Sea Week activities?	(1)	(2)	(3)	(4)	(5)	(33)
11. Did students develop a greater awareness, appreciation, and respect for the sea?	(1)	(2)	(3)	(4)	(5)	(34)
12. Did students develop decision-making skills necessary for resolution of marine issues?	(1)	(2)	(3)	(4)	(5)	(35)
13. Was the material appropriate for your students' grade level?	(1)	(2)	(3)	(4)	(5)	(36)
14. Was the teacher background section adequate?	(1)	(2)	(3)	(4)	(5)	(37)
15. Were the teacher instructions helpful & complete?	(1)	(2)	(3)	(4)	(5)	(38)
16. Were parents and other community members involved in your Sea Week?	(1)	(2)	(3)	(4)	(5)	(39)
17. Were parents favorably impressed with the Sea Week Program?	(1)	(2)	(3)	(4)	(5)	(40)
18. Did Sea Week help improve the relationship of the school to the community?	(1)	(2)	(3)	(4)	(5)	(41)

19. Rate your overall feelings about the Sea Week MATERIALS on a scale of 1 to 5. _____ (42)

20. Rate your overall feelings about the Sea Week PROGRAM on a scale of 1 to 5. _____ (43)

(1=high; 5=low)
(1=high; 5=low)

(OVER, PLEASE)

21. How many teachers are in your school? _____
How many are using Sea Week materials? _____ (44-45)
22. Do you plan to introduce the Sea Week materials to other teachers? yes _____ (1)
no _____ (2) (46)
23. Do you plan to use the Sea Week materials again? yes _____ (1) no _____ (2) (47)
24. Would you be interested in attending a marine education/Sea Week workshop?
yes _____ (1) no _____ (2) (48)
- If so, list your name and school address:
- Name _____
- Address _____
25. What other comments do you have? Are there any specific improvements you would suggest?

Please return this completed form to Jill Thayer/Belle Mickelson, Alaska Sea Grant Program,
University of Alaska, Fairbanks, Alaska 99701.